STORMWATER REPORT

Proposed Large-Scale Ground-Mounted Solar Photovoltaic Installation

0 Locust Street & 0 George D. Williams Lot
Freetown, Massachusetts

PREPARED FOR

Freetown East PV I, LLC
330 Congress Street 6th Floor
Boston, MA 02210
617.377.4301

PREPARED BY

101 Walnut Street
PO Box 9151
Watertown, MA 02471
617.924.1770

August 2021

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Checklist for Stormwater Report

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands Program

Checklist for Stormwater Report

A. Introduction

Important: When filling out forms on the computer, use only the tab key to move your cursor - do not use the return key.

A Stormwater Report must be submitted with the Notice of Intent permit application to document compliance with the Stormwater Management Standards. The following checklist is NOT a substitute for the Stormwater Report (which should provide more substantive and detailed information) but is offered here as a tool to help the applicant organize their Stormwater Management documentation for their Report and for the reviewer to assess this information in a consistent format. As noted in the Checklist, the Stormwater Report must contain the engineering computations and supporting information set forth in Volume 3 of the Massachusetts Stormwater Handbook. The Stormwater Report must be prepared and certified by a Registered Professional Engineer (RPE) licensed in the Commonwealth.

The Stormwater Report must include:

- The Stormwater Checklist completed and stamped by a Registered Professional Engineer (see page 2) that certifies that the Stormwater Report contains all required submittals.[1] This Checklist is to be used as the cover for the completed Stormwater Report.
- Applicant/Project Name
- Project Address
- Name of Firm and Registered Professional Engineer that prepared the Report
- Long-Term Pollution Prevention Plan required by Standards 4-6
- Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan required by Standard 8[2]
- Operation and Maintenance Plan required by Standard 9

In addition to all plans and supporting information, the Stormwater Report must include a brief narrative describing stormwater management practices, including environmentally sensitive site design and LID techniques, along with a diagram depicting runoff through the proposed BMP treatment train. Plans are required to show existing and proposed conditions, identify all wetland resource areas, NRCS soil types, critical areas, Land Uses with Higher Potential Pollutant Loads (LUHPPL), and any areas on the site where infiltration rate is greater than 2.4 inches per hour. The Plans shall identify the drainage areas for both existing and proposed conditions at a scale that enables verification of supporting calculations.

As noted in the Checklist, the Stormwater Management Report shall document compliance with each of the Stormwater Management Standards as provided in the Massachusetts Stormwater Handbook. The soils evaluation and calculations shall be done using the methodologies set forth in Volume 3 of the Massachusetts Stormwater Handbook.

To ensure that the Stormwater Report is complete, applicants are required to fill in the Stormwater Report Checklist by checking the box to indicate that the specified information has been included in the Stormwater Report. If any of the information specified in the checklist has not been submitted, the applicant must provide an explanation. The completed Stormwater Report Checklist and Certification must be submitted with the Stormwater Report.

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[1] The Stormwater Report may also include the Illicit Discharge Compliance Statement required by Standard 10. If not included in the Stormwater Report, the Illicit Discharge Compliance Statement must be submitted prior to the discharge of stormwater runoff to the post-construction best management practices.

[2] For some complex projects, it may not be possible to include the Construction Period Erosion and Sedimentation Control Plan in the Stormwater Report. In that event, the issuing authority has the discretion to issue an Order of Conditions that approves the project and includes a condition requiring the proponent to submit the Construction Period Erosion and Sedimentation Control Plan before commencing any land disturbance activity on the site.

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands Program

Checklist for Stormwater Report

B. Stormwater Checklist and Certification

The following checklist is intended to serve as a guide for applicants as to the elements that ordinarily need to be addressed in a complete Stormwater Report. The checklist is also intended to provide conservation commissions and other reviewing authorities with a summary of the components necessary for a comprehensive Stormwater Report that addresses the ten Stormwater Standards.

Note: Because stormwater requirements vary from project to project, it is possible that a complete Stormwater Report may not include information on some of the subjects specified in the Checklist. If it is determined that a specific item does not apply to the project under review, please note that the item is not applicable (N.A.) and provide the reasons for that determination.

A complete checklist must include the Certification set forth below signed by the Registered Professional Engineer who prepared the Stormwater Report.

Registered Professional Engineer's Certification

I have reviewed the Stormwater Report, including the soil evaluation, computations, Long-term Pollution Prevention Plan, the Construction Period Erosion and Sedimentation Control Plan (if included), the Long-term Post-Construction Operation and Maintenance Plan, the Illicit Discharge Compliance Statement (if included) and the plans showing the stormwater management system, and have determined that they have been prepared in accordance with the requirements of the Stormwater Management Standards as further elaborated by the Massachusetts Stormwater Handbook. I have also determined that the information presented in the Stormwater Checklist is accurate and that the information presented in the Stormwater Report accurately reflects conditions at the site as of the date of this permit application.

Registered Professional Engineer Block and Signature

Signature and Date 8/9/2021

Checklist

Project Type: Is the application for new development, redevelopment, or a mix of new and redevelopment?

☒ New development

☐ Redevelopment

☐ Mix of New Development and Redevelopment

Checklist for Stormwater Report

Checklist (continued)

LID Measures: Stormwater Standards require LID measures to be considered. Document what environmentally sensitive design and LID Techniques were considered during the planning and design of the project:

☒ No disturbance to any Wetland Resource Areas

☐ Site Design Practices (e.g. clustered development, reduced frontage setbacks)

☐ Reduced Impervious Area (Redevelopment Only)

☐ Minimizing disturbance to existing trees and shrubs

☐ LID Site Design Credit Requested:

- ☐ Credit 1
- ☐ Credit 2
- ☐ Credit 3

☐ Use of "country drainage" versus curb and gutter conveyance and pipe

☐ Bioretention Cells (includes Rain Gardens)

☐ Constructed Stormwater Wetlands (includes Gravel Wetlands designs)

☐ Treebox Filter

☐ Water Quality Swale

☒ Grass Channel

☐ Green Roof

☐ Other (describe): _____

Standard 1: No New Untreated Discharges

☒ No new untreated discharges

☒ Outlets have been designed so there is no erosion or scour to wetlands and waters of the Commonwealth

☒ Supporting calculations specified in Volume 3 of the Massachusetts Stormwater Handbook included.

Checklist for Stormwater Report

Checklist (continued)

Standard 2: Peak Rate Attenuation

☐ Standard 2 waiver requested because the project is located in land subject to coastal storm flowage and stormwater discharge is to a wetland subject to coastal flooding.

☐ Evaluation provided to determine whether off-site flooding increases during the 100-year 24-hour storm.

☒ Calculations provided to show that post-development peak discharge rates do not exceed pre-development rates for the 2-year and 10-year 24-hour storms. If evaluation shows that off-site flooding increases during the 100-year 24-hour storm, calculations are also provided to show that post-development peak discharge rates do not exceed pre-development rates for the 100-year 24-hour storm.

Standard 3: Recharge

THERE IS NO INCREASE OF IMPERVIOUS AREA, THEREFORE REQUIRED RECHARGE VOLUME IS 0.

☒ Soil Analysis provided.

☐ Required Recharge Volume calculation provided.

☐ Required Recharge volume reduced through use of the LID site Design Credits.

☐ Sizing the infiltration, BMPs is based on the following method: Check the method used.

☐ Static ☐ Simple Dynamic ☐ Dynamic Field[1]

☐ Runoff from all impervious areas at the site discharging to the infiltration BMP.

☐ Runoff from all impervious areas at the site is *not* discharging to the infiltration BMP and calculations are provided showing that the drainage area contributing runoff to the infiltration BMPs is sufficient to generate the required recharge volume.

☐ Recharge BMPs have been sized to infiltrate the Required Recharge Volume.

☐ Recharge BMPs have been sized to infiltrate the Required Recharge Volume *only* to the maximum extent practicable for the following reason:

- ☐ Site is comprised solely of C and D soils and/or bedrock at the land surface
- ☐ M.G.L. c. 21E sites pursuant to 310 CMR 40.0000
- ☐ Solid Waste Landfill pursuant to 310 CMR 19.000
- ☐ Project is otherwise subject to Stormwater Management Standards only to the maximum extent practicable.

☐ Calculations showing that the infiltration BMPs will drain in 72 hours are provided.

☐ Property includes a M.G.L. c. 21E site or a solid waste landfill and a mounding analysis is included.

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[1] 80% TSS removal is required prior to discharge to infiltration BMP if Dynamic Field method is used.

Checklist for Stormwater Report

Checklist (continued)

Standard 3: Recharge (continued)

☐ The infiltration BMP is used to attenuate peak flows during storms greater than or equal to the 10-year 24-hour storm and separation to seasonal high groundwater is less than 4 feet and a mounding analysis is provided.

☐ Documentation is provided showing that infiltration BMPs do not adversely impact nearby wetland resource areas.

Standard 4: Water Quality THERE IS NO INCREASE OF IMPERVIOUS AREA, THEREFORE REQUIRED WATER QUALITY VOLUME IS 0.

The Long-Term Pollution Prevention Plan typically includes the following:

- Good housekeeping practices;
- Provisions for storing materials and waste products inside or under cover;
- Vehicle washing controls;
- Requirements for routine inspections and maintenance of stormwater BMPs;
- Spill prevention and response plans;
- Provisions for maintenance of lawns, gardens, and other landscaped areas;
- Requirements for storage and use of fertilizers, herbicides, and pesticides;
- Pet waste management provisions;
- Provisions for operation and management of septic systems;
- Provisions for solid waste management;
- Snow disposal and plowing plans relative to Wetland Resource Areas;
- Winter Road Salt and/or Sand Use and Storage restrictions;
- Street sweeping schedules;
- Provisions for prevention of illicit discharges to the stormwater management system;
- Documentation that Stormwater BMPs are designed to provide for shutdown and containment in the event of a spill or discharges to or near critical areas or from LUHPPL;
- Training for staff or personnel involved with implementing Long-Term Pollution Prevention Plan;
- List of Emergency contacts for implementing Long-Term Pollution Prevention Plan.

☐ A Long-Term Pollution Prevention Plan is attached to Stormwater Report and is included as an attachment to the Wetlands Notice of Intent.

☐ Treatment BMPs subject to the 44% TSS removal pretreatment requirement and the one inch rule for calculating the water quality volume are included, and discharge:

- ☐ is within the Zone II or Interim Wellhead Protection Area
- ☐ is near or to other critical areas
- ☐ is within soils with a rapid infiltration rate (greater than 2.4 inches per hour)
- ☐ involves runoff from land uses with higher potential pollutant loads.

☐ The Required Water Quality Volume is reduced through use of the LID site Design Credits.

☐ Calculations documenting that the treatment train meets the 80% TSS removal requirement and, if applicable, the 44% TSS removal pretreatment requirement, are provided.

Checklist for Stormwater Report

Checklist (continued)

Standard 4: Water Quality (continued)

☐ The BMP is sized (and calculations provided) based on:

- ☐ The ½" or 1" Water Quality Volume or
- ☐ The equivalent flow rate associated with the Water Quality Volume and documentation is provided showing that the BMP treats the required water quality volume.

☐ The applicant proposes to use proprietary BMPs, and documentation supporting use of proprietary BMP and proposed TSS removal rate is provided. This documentation may be in the form of the propriety BMP checklist found in Volume 2, Chapter 4 of the Massachusetts Stormwater Handbook and submitting copies of the TARP Report, STEP Report, and/or other third party studies verifying performance of the proprietary BMPs.

☐ A TMDL exists that indicates a need to reduce pollutants other than TSS and documentation showing that the BMPs selected are consistent with the TMDL is provided.

Standard 5: Land Uses With Higher Potential Pollutant Loads (LUHPPLs) N/A

☐ The NPDES Multi-Sector General Permit covers the land use and the Stormwater Pollution Prevention Plan (SWPPP) has been included with the Stormwater Report.

☒ The NPDES Multi-Sector General Permit covers the land use and the SWPPP will be submitted ***prior to*** the discharge of stormwater to the post-construction stormwater BMPs.

☐ The NPDES Multi-Sector General Permit does ***not*** cover the land use.

☐ LUHPPLs are located at the site and industry specific source control and pollution prevention measures have been proposed to reduce or eliminate the exposure of LUHPPLs to rain, snow, snow melt and runoff, and been included in the long term Pollution Prevention Plan.

☐ All exposure has been eliminated.

☐ All exposure has ***not*** been eliminated and all BMPs selected are on MassDEP LUHPPL list.

☐ The LUHPPL has the potential to generate runoff with moderate to higher concentrations of oil and grease (e.g. all parking lots with >1000 vehicle trips per day) and the treatment train includes an oil grit separator, a filtering bioretention area, a sand filter or equivalent.

Standard 6: Critical Areas THERE IS NO INCREASE OF IMPERVIOUS AREA, THEREFORE REQUIRED WATER QUALITY VOLUME IS 0.

☐ The discharge is near or to a critical area and the treatment train includes only BMPs that MassDEP has approved for stormwater discharges to or near that particular class of critical area.

☒ Critical areas and BMPs are identified in the Stormwater Report.

Checklist for Stormwater Report

Checklist (continued)

Standard 7: Redevelopments and Other Projects Subject to the Standards only to the maximum extent practicable N/A

☐ The project is subject to the Stormwater Management Standards only to the maximum Extent Practicable as a:

- ☐ Limited Project
- ☐ Small Residential Projects: 5-9 single family houses or 5-9 units in a multi-family development provided there is no discharge that may potentially affect a critical area.
- ☐ Small Residential Projects: 2-4 single family houses or 2-4 units in a multi-family development with a discharge to a critical area
- ☐ Marina and/or boatyard provided the hull painting, service and maintenance areas are protected from exposure to rain, snow, snow melt and runoff
- ☐ Bike Path and/or Foot Path
- ☐ Redevelopment Project
- ☐ Redevelopment portion of mix of new and redevelopment.

☐ Certain standards are not fully met (Standard No. 1, 8, 9, and 10 must always be fully met) and an explanation of why these standards are not met is contained in the Stormwater Report.

☐ The project involves redevelopment and a description of all measures that have been taken to improve existing conditions is provided in the Stormwater Report. The redevelopment checklist found in Volume 2 Chapter 3 of the Massachusetts Stormwater Handbook may be used to document that the proposed stormwater management system (a) complies with Standards 2, 3 and the pretreatment and structural BMP requirements of Standards 4-6 to the maximum extent practicable and (b) improves existing conditions.

Standard 8: Construction Period Pollution Prevention and Erosion and Sedimentation Control

A Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan must include the following information:

- Narrative;
- Construction Period Operation and Maintenance Plan;
- Names of Persons or Entity Responsible for Plan Compliance;
- Construction Period Pollution Prevention Measures;
- Erosion and Sedimentation Control Plan Drawings;
- Detail drawings and specifications for erosion control BMPs, including sizing calculations;
- Vegetation Planning;
- Site Development Plan;
- Construction Sequencing Plan;
- Sequencing of Erosion and Sedimentation Controls;
- Operation and Maintenance of Erosion and Sedimentation Controls;
- Inspection Schedule;
- Maintenance Schedule;
- Inspection and Maintenance Log Form.

☒ A Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan containing the information set forth above has been included in the Stormwater Report.

Checklist for Stormwater Report

Checklist (continued)

Standard 8: Construction Period Pollution Prevention and Erosion and Sedimentation Control (continued)

☐ The project is highly complex and information is included in the Stormwater Report that explains why it is not possible to submit the Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan with the application. A Construction Period Pollution Prevention and Erosion and Sedimentation Control has ***not*** been included in the Stormwater Report but will be submitted ***before*** land disturbance begins.

☐ The project is ***not*** covered by a NPDES Construction General Permit.

☐ The project is covered by a NPDES Construction General Permit and a copy of the SWPPP is in the Stormwater Report.

☒ The project is covered by a NPDES Construction General Permit but no SWPPP been submitted. The SWPPP will be submitted BEFORE land disturbance begins.

Standard 9: Operation and Maintenance Plan

☒ The Post Construction Operation and Maintenance Plan is included in the Stormwater Report and includes the following information:

- ☒ Name of the stormwater management system owners;
- ☐ Party responsible for operation and maintenance;
- ☒ Schedule for implementation of routine and non-routine maintenance tasks;
- ☒ Plan showing the location of all stormwater BMPs maintenance access areas;
- ☐ Description and delineation of public safety features;
- ☐ Estimated operation and maintenance budget; and
- ☒ Operation and Maintenance Log Form.

☐ The responsible party is ***not*** the owner of the parcel where the BMP is located and the Stormwater Report includes the following submissions:

- ☐ A copy of the legal instrument (deed, homeowner's association, utility trust or other legal entity) that establishes the terms of and legal responsibility for the operation and maintenance of the project site stormwater BMPs;
- ☐ A plan and easement deed that allows site access for the legal entity to operate and maintain BMP functions.

Standard 10: Prohibition of Illicit Discharges

☒ The Long-Term Pollution Prevention Plan includes measures to prevent illicit discharges;

☐ An Illicit Discharge Compliance Statement is attached;

☐ NO Illicit Discharge Compliance Statement is attached but will be submitted ***prior to*** the discharge of any stormwater to post-construction BMPs.

Stormwater Report Narrative

This Stormwater Report has been prepared to demonstrate compliance with the Massachusetts Stormwater Management Standards in accordance with the Massachusetts Wetlands Protection Act Regulations (310 CMR 10.00).

Project Description

The Applicant, Freetown East PV I, LLC, is proposing to construct a ±4.5-megawatt (AC) Ground-Mounted Solar Photovoltaic array (the Project) located at 0 Locust Street and 0 George D. Williams Lot in Freetown, Massachusetts (the Site). As proposed, the Project consists of approximately 24.6 acres of solar panels, utility infrastructure, access road, fencing and related amenities to support this use.

Site Description

The Project Site is a 53.2-acre parcel of land (the Site) located at 0 Locust Street and 0 George D. Williams Lot, Freetown, Massachusetts (see Figure 1). The Site lies within the surface watershed of the Taunton River and is bounded by Locust Street and residences to the east, woodlands and residences to the north, woodlands to the west, and an existing commercial development and existing solar array to the south. See Figure 1, Site Locus Map. The Site is located within the Zone X flood zone (See Figure 4). While portions of the Site are located within the shaded Zone X zone, this area is designated as areas of 0.2% annual chance flood and is considered outside of the 100-year floodplain.

Wetland Resource Areas on the Site include the following:

Table 1 Existing Conditions Hydrologic Data

Name	Critical Area (yes/no)	Zone 1 or Zone A (yes/no)	ORW or SRW (yes/no)	Zone II or IWPA (yes/no)	Other
Wetland 1	No	No	No	No	Bordering Vegetated Wetland (BVW)
Wetland 2	No	No	No	No	Bordering Vegetated Wetland (BVW) Intermittent stream
Wetland 3	Yes	No	No*	No	Bordering Vegetated Wetland (BVW) *Potential Vernal Pools

For additional information regarding the wetland resource areas present on the site see the Project Notice of Intent prepared by VHB dated August 2021.

According to the National Resources Conservation Service (NRCS), surface soils on the Site include Scarboro mucky fine sandy loam, Whitman fine sandy loam, Merrimac fine sandy loam, Paxton fine sandy loam, Paxton fine sandy loam, Woodbridge fine sandy loam, and Gloucester-Hinckley Complex. On-site soils are classified as Hydrologic Soil Groups (HSG) A, C, and D. Based on the soil evaluation included in Appendix C, the Site is not considered to be within an area of rapid infiltration (soils with a saturated hydraulic conductivity greater than 2.4 inches per hour).

VHB conducted preliminary test pits on April 8, 2021 in the locations of proposed stormwater BMPs. Test pits conducted at the western and southern portions of the site indicated that while the soils were considered sandy loam, groundwater at those locations were high at approximately 18”-24” below ground surface elevation. Groundwater was not encountered within test pits conducted on the northern and eastern portions of the site and was classified as sandy loam from approximately 14” below grade to 36” below grade. Preliminary logs can be found in Appendix C.

Existing Drainage Conditions

Under existing conditions, the Site is undeveloped woodlands with light underbrush and hilly topography. The wetlands on site are located at the western property line, in the center of the property, and at the southeast corner. Figure 2 illustrates the existing drainage patterns on the Site. Currently, the Site is divided into three (3) drainage areas as stormwater runoff flows to three (3) Design Points, which have been identified as DP-1: Wetland 1, DP-2: Wetland 2, and DP-3: Wetland 3. EX-1 consists of the majority of the western part of the property, EX-2 consists of the center of the property, and EX-3 consists of the area to the east part of the property, up to Locust Street. Table 2 below provides a summary of the existing conditions hydrologic data.

Table 2 Existing Conditions Hydrologic Data

Drainage Area	Discharge Location	Design Point	Area (Acres)	Curve Number	Time of Concentration (min)
EX-1	Wetland 1	DP-1	9.6	72	32.6
EX-2	Wetland 2	DP-2	19.3	73	32.2
EX-3	Wetland 3	DP-3	7.7	54	24.6

Proposed Drainage Conditions

Figure 3 illustrates the proposed "post construction" drainage conditions for the project. As shown, the Site will be divided into three (3) drainage areas that discharge treated stormwater to the three (3) existing Design Points. Table 3 below provides a summary of the proposed conditions hydrologic data.

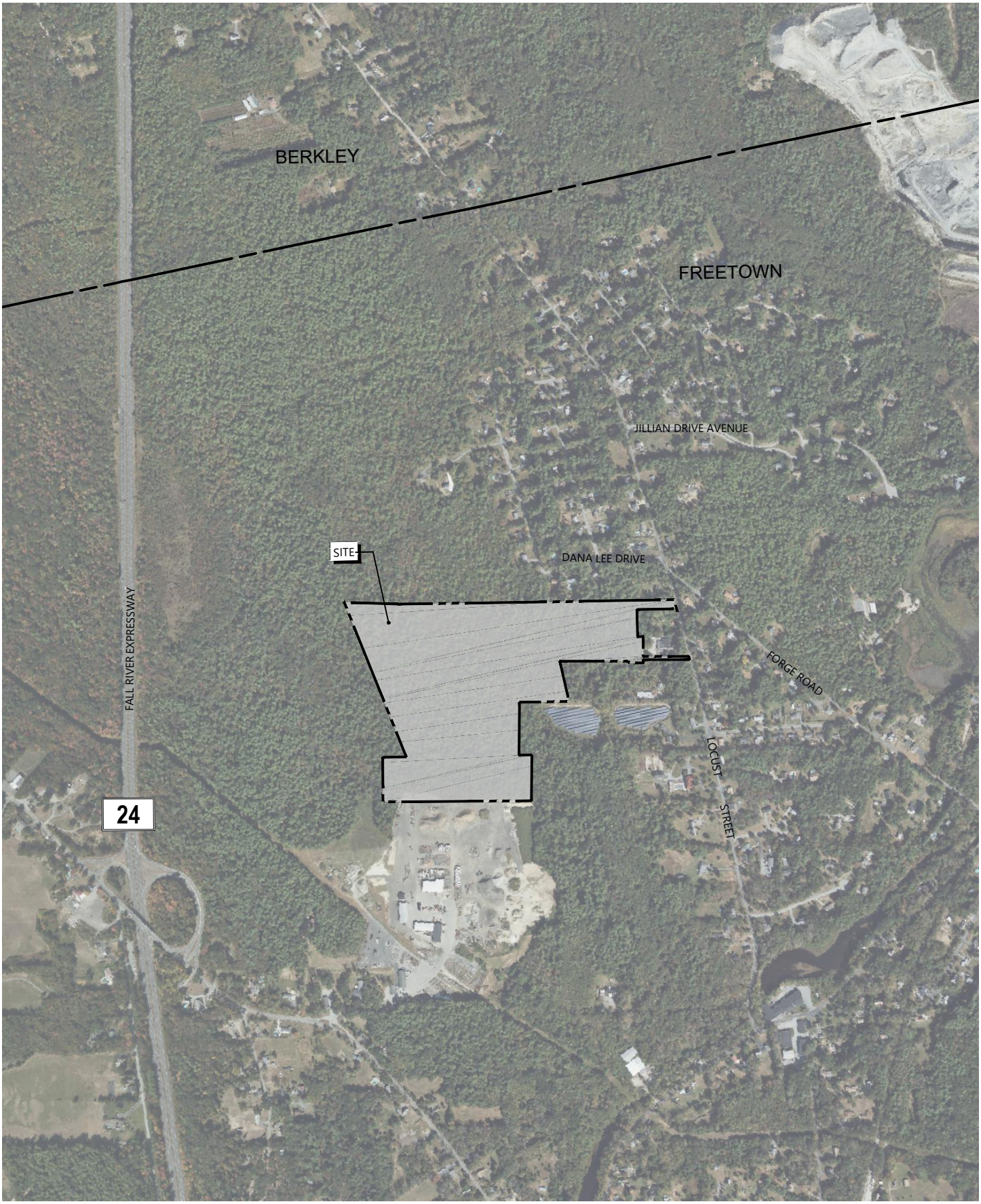
Table 3 Proposed Conditions Hydrologic Data

Drainage Area	Discharge Location	Design Point	Area (Acres)	Curve Number	Time of Concentration (min)
PR-1A	Wetland 1	DP-1	6.2	79	33.6
PR-1B	Wetland 1	DP-1	3.6	72	23.1
PR-2A	Wetland 2	DP-2	6.4	79	29.7
PR-2B	Wetland 2	DP-2	9.0	77	18.0
PR-2C	Wetland 2	DP-2	3.5	67	17.2
PR-3	Wetland 3	DP-3	7.7	57	26.2

While the project requires tree clearing, a 50' natural undisturbed buffer has been provided between the limit of clearing and the wetland edge where feasible. Within the limit of work, excluding the proposed gravel drive and detention basins, a meadow mix seed mix is proposed for groundcover. The meadow mix has a similar curve number compared to the existing woodlands on site. A 20' wide gravel path has been proposed for fire and maintenance access to the panels and where feasible is proposed along the alignment of existing cart paths throughout the site. The gravel roads have been graded so that the majority of the runoff is drained towards the proposed detention basins. A 7' high chain link fence with barb wire surrounds the array for security.

In general, stormwater runoff from drainage areas PR-1, PR-2, and PR-3 is conveyed towards surface detention basins to mitigate peak runoff rates under proposed conditions. These detention basins are graded so that the water will be conveyed towards the outlet control structure which discharges to an area which is located outside the 50' natural buffers of the design points.

As there is a de minimis increase in impervious area based on the installation of three small concrete pads, the site design integrates a comprehensive stormwater management system that has been developed to adhere to the Massachusetts Stormwater Standards.



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Site Locus
Locust Street
Freetown, Massachusetts

Figure 1

8/9/2021

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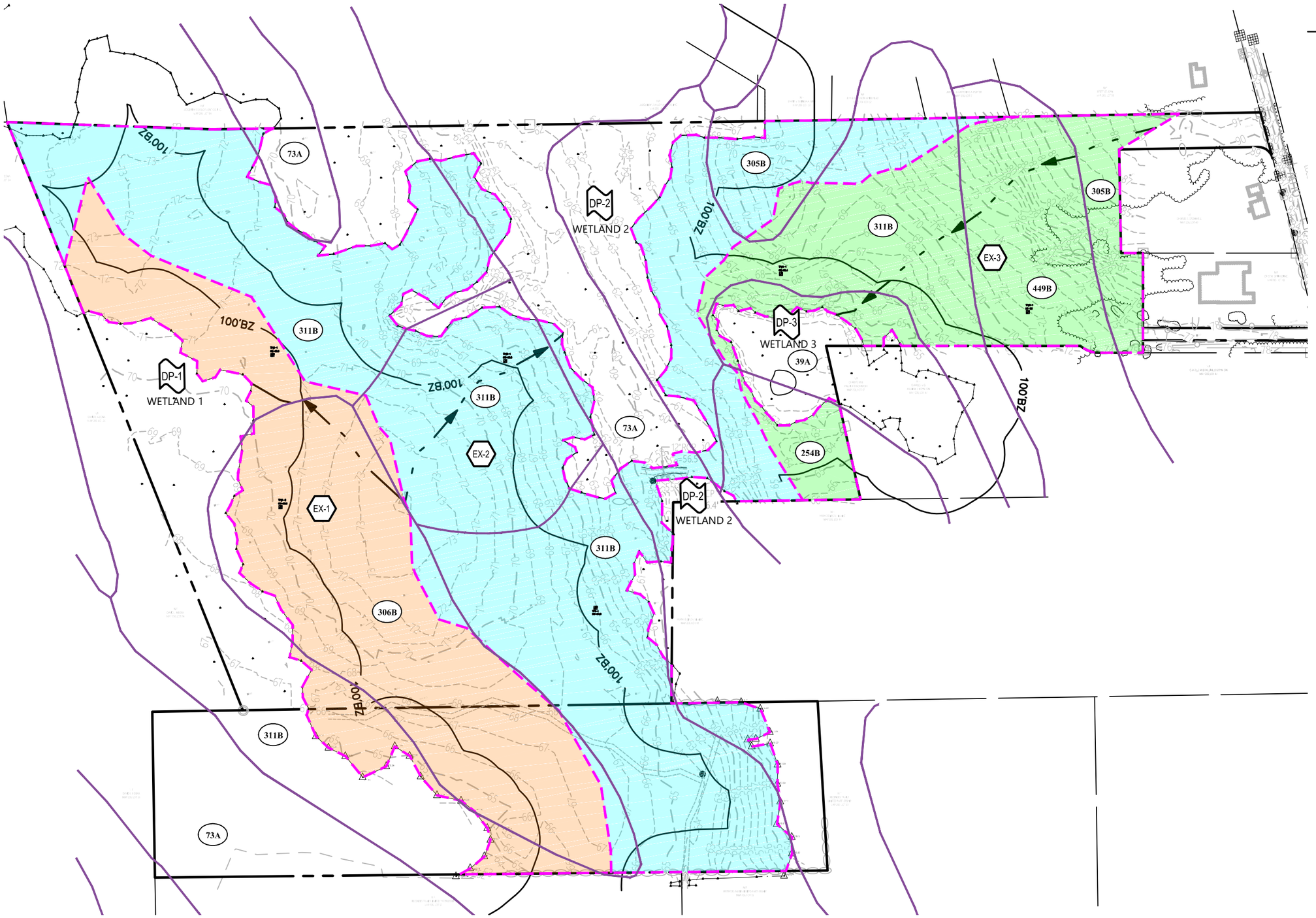


Legend

SYMBOLS

- DESIGN POINT
- DRAINAGE AREA DESIGNATION
- POND

LINETYPES

- DRAINAGE AREA BOUNDARY
- TIME OF CONCENTRATION FLOW LINE
- SOIL TYPE BOUNDARY
- 100' BUFFER ZONE
- WETLAND BOUNDARY
- DRAINAGE AREA EX-1
- DRAINAGE AREA EX-2
- DRAINAGE AREA EX-3

SCS SOIL CLASSIFICATIONS

39A	SCARBORO MUCKY FINE SANDY LOAM, 0 TO 3 PERCENT SLOPES, HSG D
73A	WHITMAN FINE SANDY LOAM, 0 TO 3 PERCENT SLOPES, EXTREMELY STONY, HSG D
254B	MERRIMAC FINE SANDY LOAM, 3 TO 8 PERCENT SLOPES, HSG A
305B	PAXTON FINE SANDY LOAM, 3 TO 8 PERCENT SLOPES, HSG C
306B	PAXTON FINE SANDY LOAM, 0 TO 8 PERCENT SLOPES, VERY STONY, HSG C
311B	WOODBRIDGE FINE SANDY LOAM, 0 TO 8 PERCENT SLOPES, VERY STONY, HSG D
449B	GLOUCESTER-HINCKLEY COMPLEX, 3 TO 8 PERCENT SLOPES, HSG A

0 100 200 Feet

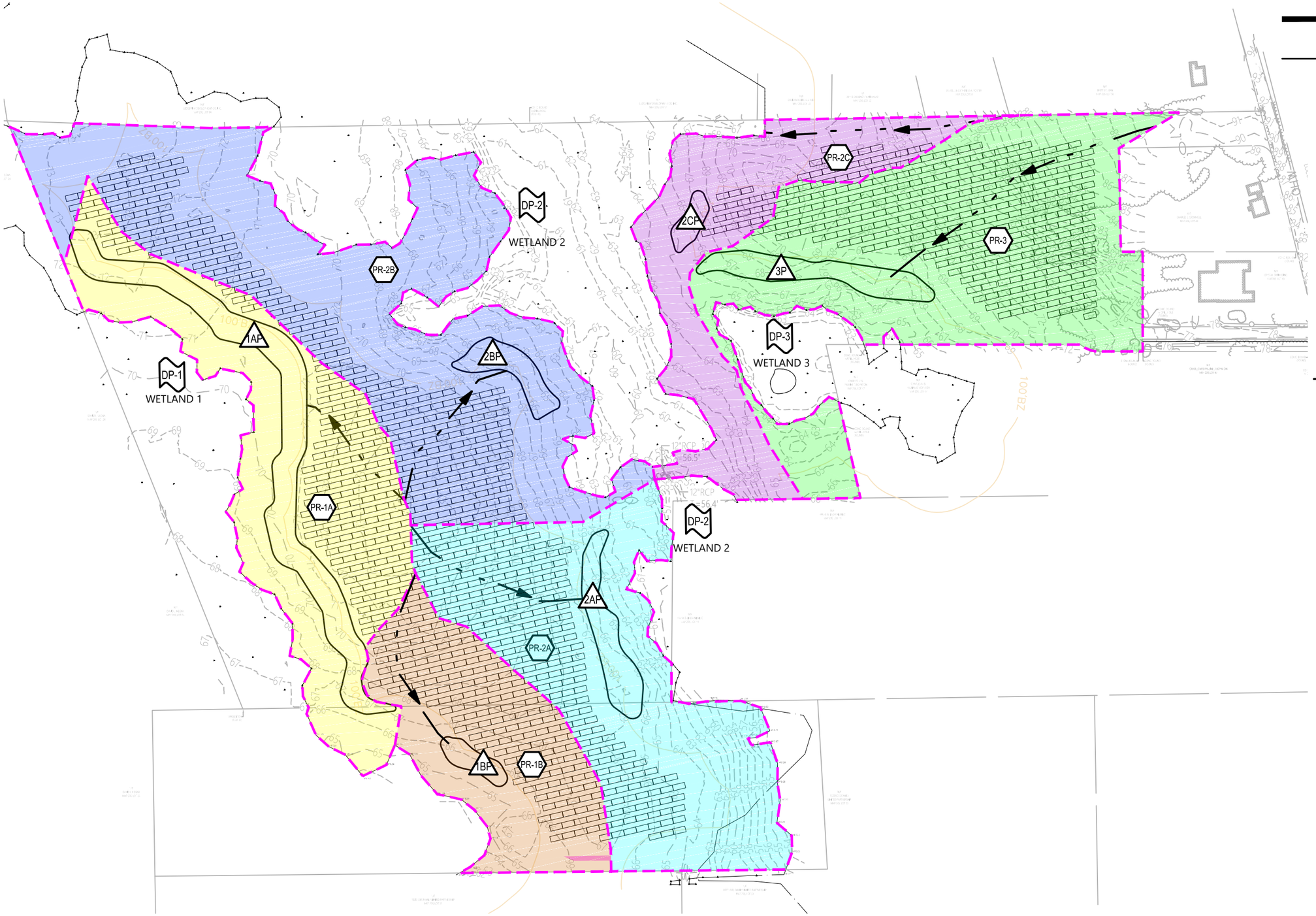
Existing Drainage Conditions

Figure 2

Locust Street
Freetown, Massachusetts

8/9/2021

\\Vhb\gbl\proj\Wat-EV\15225.02 Longroad-TO2-Freetown\cad\ld\Eng\Drainage\15225.02-PR Drainage.dwg



Legend

SYMBOLS

- DESIGN POINT
- DRAINAGE AREA DESIGNATION
- POND

LINETYPES

- DRAINAGE AREA BOUNDARY
- TIME OF CONCENTRATION FLOW LINE
- 100' BUFFER ZONE
- WETLAND BOUNDARY
- DRAINAGE AREA PR-1A
- DRAINAGE AREA PR-1B
- DRAINAGE AREA PR-2A
- DRAINAGE AREA PR-2B
- DRAINAGE AREA PR-2C
- DRAINAGE AREA PR-3

0 100 200 Feet

vhb

Proposed Drainage Conditions

Figure 3

Locust Street
Freetown, Massachusetts

8/9/2021

NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The **community map repository** should be consulted for possible updated or additional flood hazard information.

To obtain more detailed information in areas where **Base Flood Elevations** (BFEs) and/or **floodways** have been determined, users are encouraged to consult the Flood Profiles and Floodway Data and/or Summary of Stillwater Elevations tables contained within the Flood Insurance Study (FIS) Report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS Report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

Coastal Base Flood Elevations shown on this map apply only landward of 0.0' North American Vertical Datum of 1988 (NAVD 88). Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations table in the Flood Insurance Study Report for this jurisdiction. Elevations shown in the Summary of Stillwater Elevations table should be used for construction and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

Boundaries of the **floodways** were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study Report for this jurisdiction.

The AE Zone category has been divided by a **Limit of Moderate Wave Action (LiMWA)**. The LiMWA represents the approximate landward limit of the 1.5-foot breaking wave. The effects of wave hazards between the VE Zone and the LiMWA (or between the shoreline and the LiMWA for areas where VE Zones are not identified) will be similar to, but less severe than those in the VE Zone.

Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures**. Refer to Section 2.4 "Flood Protection Measures" of the Flood Insurance Study Report for information on flood control structures for this jurisdiction.

The **projection** used in the preparation of this map was Massachusetts State Plane Mainland Zone (FIPS zone 2001). The **horizontal datum** was NAD 83, GRS 1980 spheroid. Differences in datum, spheroid, projection or UTM zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

Flood elevations on this map are referenced to the North American Vertical Datum of 1988. These flood elevations must be compared to structure and ground elevations referenced to the same **vertical datum**. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at http://www.ngs.noaa.gov or contact the National Geodetic Survey at the following address:

NGS Information Services
NOAA, N/NGS12
National Geodetic Survey
SSMC-3, #9202
1315 East-West Highway
Silver Spring, Maryland 20910-3282
(301) 713-3242

To obtain current elevation, description, and/or location information for **bench marks** shown on this map, please contact the Information Services Branch of the National Geodetic Survey at **(301) 713- 3242**, or visit its website at http://www.ngs.noaa.gov.

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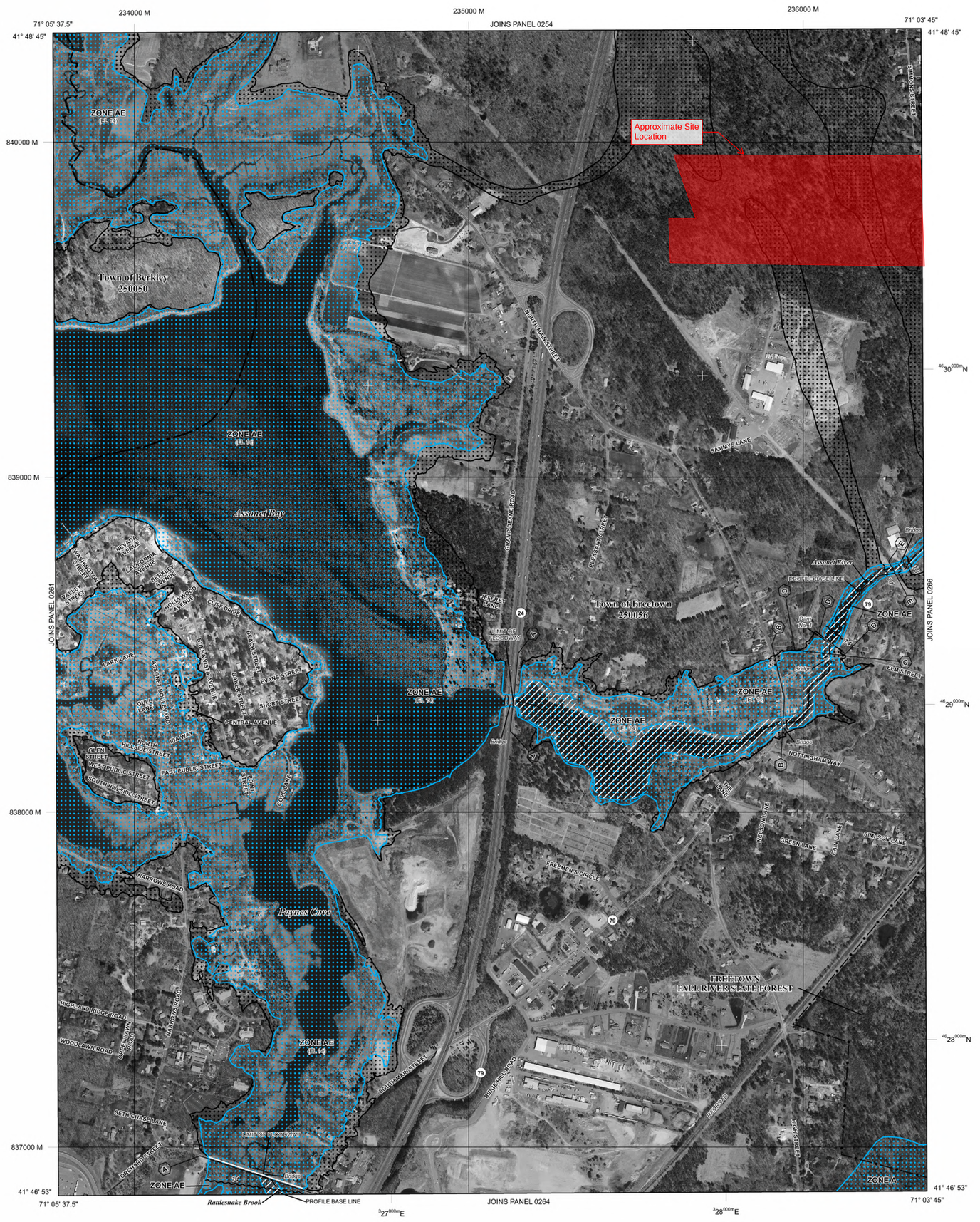

LEGEND

SPECIAL FLOOD HAZARD AREAS (SFHAs) SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

ZONE A	No Base Flood Elevations determined.
ZONE AE	Base Flood Elevations determined.
ZONE AH	Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
ZONE AO	Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
ZONE AR	Special Flood Hazard Areas formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
ZONE A99	Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.
ZONE V	Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
ZONE VE	Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X	Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X	Areas determined to be outside the 0.2% annual chance floodplain.
ZONE D	Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

- 1% Annual Chance Floodplain Boundary
- 0.2% Annual Chance Floodplain Boundary
- Floodway boundary
- Zone D boundary
- CBRS and OPA boundary
- Boundary dividing Special Flood Hazard Area Zones and boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths, or flood velocities.
- Limit of Moderate Wave Action
- Limit of Moderate Wave Action coincident with Zone Break
- 513 — Base Flood Elevation line and value; elevation in feet*
- (EL 987) — Base Flood Elevation value where uniform within zone; elevation in feet*

*Referenced to the North American Vertical Datum of 1988

- A — A — Cross section line
- 23 — 23 — Transect line
- Culvert
- Bridge
- 45° 02' 08", 93° 02' 12" — Geographic coordinates referenced to the North American Datum of 1983 (NAD 83) Western Hemisphere
- 4989000 M — 1000-meter grid values: Massachusetts State Plane Mainland Zone (FIPS Zone 2001), Lambert Conformal Conic projection
- 4°89'000mN — 1000-meter Universal Transverse Mercator grid ticks, zone 19N
- DX5510 — Bench mark (see explanation in Notes to Users section of this FIRM panel)
- M1.5 — River Mile

MAP REPOSITORIES
Refer to Map Repositories list on Map Index

EFFECTIVE DATE OF COUNTYWIDE FLOOD INSURANCE RATE MAP
July 7, 2009
EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL:
July 16, 2014 - to change Base Flood Elevations and Special Flood Hazard Areas, to change zone designations, to update the effects of wave action, to update corporate limits, to add roads and road names, to incorporate previously issued Letters of Map Revision and and to modify Coastal Barrier Resources System units.
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MAP SCALE 1" = 500'
250 0 500 1000 FEET
150 0 150 300 METERS

NFIP
NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0262G

FIRM

FLOOD INSURANCE RATE MAP

BRISTOL COUNTY, MASSACHUSETTS
(ALL JURISDICTIONS)

PANEL 262 OF 550
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
BERKLEY, TOWN OF	250050	0262	G
FREETOWN, TOWN OF	250056	0262	G

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
25005C0262G
MAP REVISED
JULY 16, 2014

Federal Emergency Management Agency

NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The **community map repository** should be consulted for possible updated or additional flood hazard information.

To obtain more detailed information in areas where **Base Flood Elevations** (BFEs) and/or **floodways** have been determined, users are encouraged to consult the Flood Profiles and Floodway Data and/or Summary of Stillwater Elevations tables contained within the Flood Insurance Study (FIS) Report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS Report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

Coastal Base Flood Elevations shown on this map apply only landward of 0.0' North American Vertical Datum of 1988 (NAVD 88). Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations table in the Flood Insurance Study Report for this jurisdiction. Elevations shown in the Summary of Stillwater Elevations table should be used for construction and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

Boundaries of the **floodways** were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study Report for this jurisdiction.

The AE Zone category has been divided by a **Limit of Moderate Wave Action (LiMWA)**. The LiMWA represents the approximate landward limit of the 1.5-foot breaking wave. The effects of wave hazards between the VE Zone and the LiMWA (or between the shoreline and the LiMWA for areas where VE Zones are not identified) will be similar to, but less severe than those in the VE Zone.

Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures**. Refer to Section 2.4 "Flood Protection Measures" of the Flood Insurance Study Report for information on flood control structures for this jurisdiction.

The **projection** used in the preparation of this map was Massachusetts State Plane Mainland Zone (FIPS zone 2001). The **horizontal datum** was NAD 83, GRS 1980 spheroid. Differences in datum, spheroid, projection or UTM zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

Flood elevations on this map are referenced to the North American Vertical Datum of 1988. These flood elevations must be compared to structure and ground elevations referenced to the same **vertical datum**. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at http://www.ngs.noaa.gov or contact the National Geodetic Survey at the following address:

NGS Information Services
NOAA, N/NGS12
National Geodetic Survey
SSMC-3, #9202
1315 East-West Highway
Silver Spring, Maryland 20910-3282
(301) 713-3242

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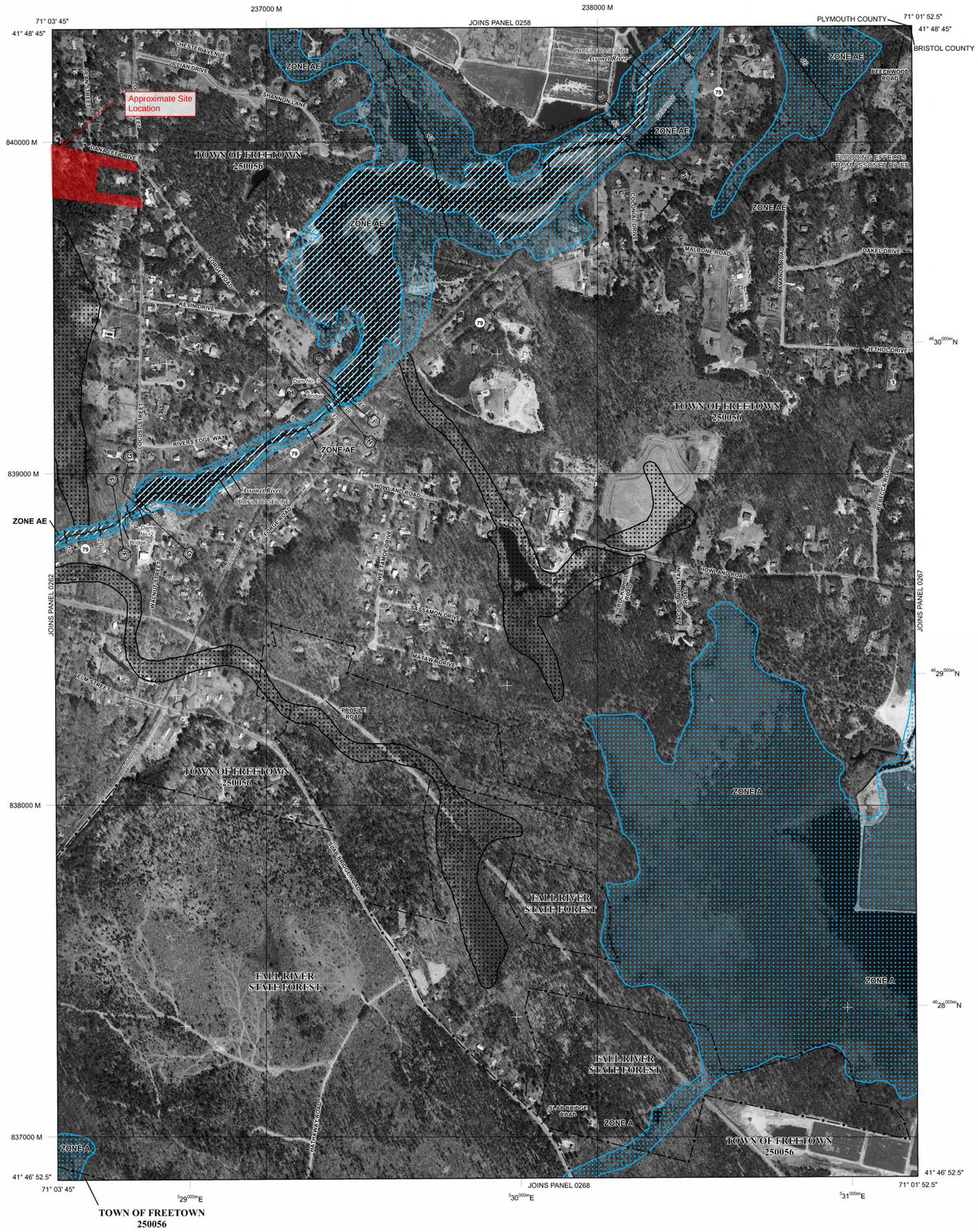

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NFIP NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0266G

FIRM

FLOOD INSURANCE RATE MAP

BRISTOL COUNTY, MASSACHUSETTS (ALL JURISDICTIONS)

PANEL 266 OF 550
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
FREETOWN, TOWN OF	250056	0266	G

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MAP NUMBER
25005C0266G

MAP REVISED
JULY 16, 2014

Federal Emergency Management Agency

Regulatory Compliance

Massachusetts Department of Environmental Protection (DEP) – Stormwater Management Standards

As demonstrated below, the proposed Project fully complies with the DEP Stormwater Management Standards.

Standard 1: No New Untreated Discharges or Erosion to Wetlands

The Project has been designed to comply with Standard 1.

The Best Management Practices (BMPs) included in the proposed stormwater management system have been designed in accordance with the Massachusetts Stormwater Handbook. Supporting information and computations demonstrating that no new untreated discharges will result from the Project are presented through compliance with Standards 4 through 6.

All proposed Project stormwater outlets and conveyances have been designed to not cause erosion or scour to wetlands or receiving waters. Outlets from detention basins have been designed with flared end sections and stone protection to dissipate discharge velocities. Overflows from BMP's that impound stormwater have been designed with stone to protect downgradient areas from erosion.

Computations and supporting information are included in Appendix A.

Standard 2: Peak Rate Attenuation

The Project has been designed to comply with Standard 2.

The rainfall-runoff response of the Site under existing and proposed conditions was analyzed for storm events with recurrence intervals of 2, 10, 25 and 100 years. Rainfall volumes used for this analysis were based on the Natural Resources Conservation Service (NRCS) Type III, 24-hour storm and NOAA Atlas 14 precipitation depths for the site: *3.4*, *5.07*, *6.11*, and *7.71* inches, respectively. Runoff coefficients for the pre- and post-development conditions, as previously shown in Tables 2 and 3 respectively, were determined using NRCS Technical Release 55 (TR-55) methodology as provided in HydroCAD. The results of the analysis, as summarized in Table 4

below, indicate that there is no increase in peak discharge rates between the existing and proposed conditions.

Computations and supporting information regarding the hydrologic modeling are included in Appendix B.

Table 4 Peak Discharge Rates (cfs*)

Design Point	2-year	10-year	25-year	100-year
DP-1: Wetland 1				
Existing	6.1	13.6	18.8	27.2
Proposed	3.1	10.4	14.0	19.4
DP-2: Wetland 2				
Existing	13.0	28.6	39.2	56.2
Proposed	7.8	25.7	38.5	53.6
DP-3: Wetland 3				
Existing	0.7	4.2	7.3	13.0
Proposed	0.3	1.5	4.9	8.9

Standard 3: Stormwater Recharge

The Project has been designed to comply with Standard 3.

The Project does not result in an increase of impervious area. Therefore, in accordance with the Stormwater Handbook, the Required Recharge Volume for the Project is 0 cubic feet.

Soil evaluation, including preliminary test pit data, and supporting information are included in Appendix C.

Standard 4: Water Quality

The Project has been designed to comply with Standard 4.

The Project does not result in an increase of impervious area. Therefore, in accordance with the Stormwater Handbook, the Required Water Quality Treatment Volume is 0 cubic feet.

Standard 5: Land Uses with Higher Potential Pollutant Loads (LUHPPLs)

The Project is not considered a LUHPPL.

Standard 6: Critical Areas

Wetland 3 is considered a critical area due to the presence of potential vernal pools, however is not considered an Outstanding Resource Waters as the vernal pools are not certified. As such, a SWPPP will be completed as part of the Notice of Intent filing. The stormwater BMP nearest to

Wetland 3 is designed with a 50' minimum undisturbed natural buffer between the BMP and wetland edge. Due to site constraints of high groundwater, infiltration is not feasible and detention basins have been proposed. The detention basins are not located within a Zone A and do not utilize any proprietary BMPs.

While the potential vernal pools within Wetland 3 are not certified, the stormwater BMP is located over 100 feet from the potential vernal pools. The stormwater BMPs have been sized to mitigate peak runoff of the subcatchment due to the minor change in cover type. As there is no impervious area proposed, no treatment in regard to the water quality volume and TSS removal is required.

Standard 7: Redevelopments and Other Projects Subject to the Standards only to the Maximum Extent Practicable

The Project is not considered a redevelopment and has been designed to comply with all ten of the Stormwater Management Standards.

Standard 8: Construction Period Pollution Prevention and Erosion and Sedimentation Controls

The Project will disturb approximately 24.3 acres of land and is therefore required to obtain coverage under the Environmental Protection Agency (EPA) National Pollutant Discharge Elimination System (NPDES) Construction General Permit. As required under this permit, a Stormwater Pollution Prevention Plan (SWPPP) will be developed and submitted before land disturbance begins. Recommended construction period pollution prevention and erosion and sedimentation controls to be finalized in the SWPPP are included in Appendix D.

Standard 9: Operation and Maintenance Plan

In compliance with Standard 9, a Post Construction Stormwater Operation and Maintenance (O&M) Plan has been developed for the Project. The O&M Plan is included in Appendix E.

Standard 10: Prohibition of Illicit Discharges

The site was previously undeveloped, and no sanitary sewer or storm drainage infrastructure is known to exist on the site. The design plans submitted with this report have been designed in full compliance with current standards, and there is no proposed sewer as part of this project. The Long-Term Pollution Prevention Plan includes measures to prevent illicit discharges.

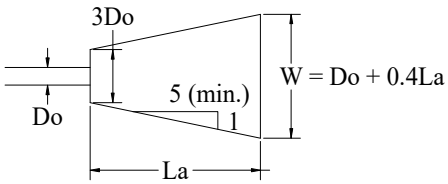
Appendix A: Standard 1 Computations and Supporting Information

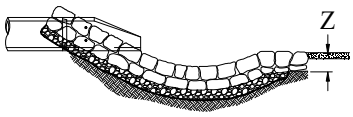
› Stone for Pipe End Sizing

Outfall Riprap Sizing and Velocity Calculations

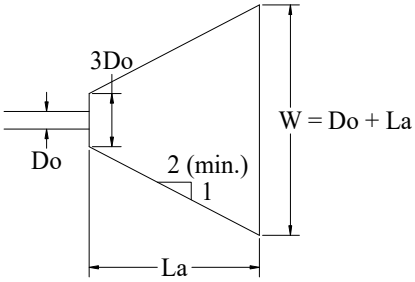
Project	Proposed Solar Array	**Project #**	15225.02
Calculated by	SKE	**Date**	7/21/2021
Checked by	JRG	**Date**	7/21/2021

Tw ≥ 0.5Do





Tw < 0.5Do



OUTLET DESCRIPTION:		**FES-102**	**FES-104**	**FES-202**	**FES-204**	**FES-206**	**FES-302**
Design Storm	(yr)	25	25	25	25	25	25
Flow / Discharge (Q)	(cfs)	7.0	3.0	6.8	5.0	3.9	4.9
Defined Channel ?	-	NO	NO	NO	NO	NO	NO
Defined Channel Width	(ft)						
Outlet Pipe Diameter (D_O)	(in)	12	12	12	12	12	12
Tailwater Condition (T_W)	(ft)	TW < 0.5D	TW < 0.5D	TW < 0.5D	TW < 0.5D	TW < 0.5D	TW < 0.5D
Apron Length (L_A)	(ft)	10	10	10	10	10	10
Min. Apron Width at Outlet ($3D_O$	(ft)	3	3	3	3	3	3
Min. Apron Width at End (W)	(ft)	11	11	11	11	11	11
Median Stone Diameter (d_{50})	(in)	6	6	6	6	6	6
Largest Stone Diameter	(in)	9	9	9	9	9	9
Apron Depth (Z)	(in)	13.5	13.5	13.5	13.5	13.5	13.5

Outfall Riprap Sizing and Velocity Calculations

Project	Proposed Solar Array	**Project #**	15225.02
Calculated by	SKE	**Date**	7/21/2021
Checked by	JRG	**Date**	7/21/2021

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Appendix B: Standard 2 Computations and Supporting Information

The rainfall-runoff response of the Site under existing and proposed conditions was evaluated for storm events with recurrence intervals of 2, 10, 25 and 100-years. Rainfall volumes used for this analysis were based on the Natural Resources Conservation Service (NRCS) Type III, 24-hour storm and NOAA Atlas 14 precipitation depths for the site: *3.4*, *5.07, 6.11*, and *7.71* inches, respectively. Runoff coefficients for the pre- and post-development conditions, as previously shown in Tables 2 and 3 respectively, were determined using NRCS Technical Release 55 (TR-55) methodology as provided in HydroCAD. Drainage areas used in the analyses were described in previous sections and shown on Figures 2 and 3. The HydroCAD model is based on the NRCS Technical Release 20 (TR-20) Model for Project Formulation Hydrology.

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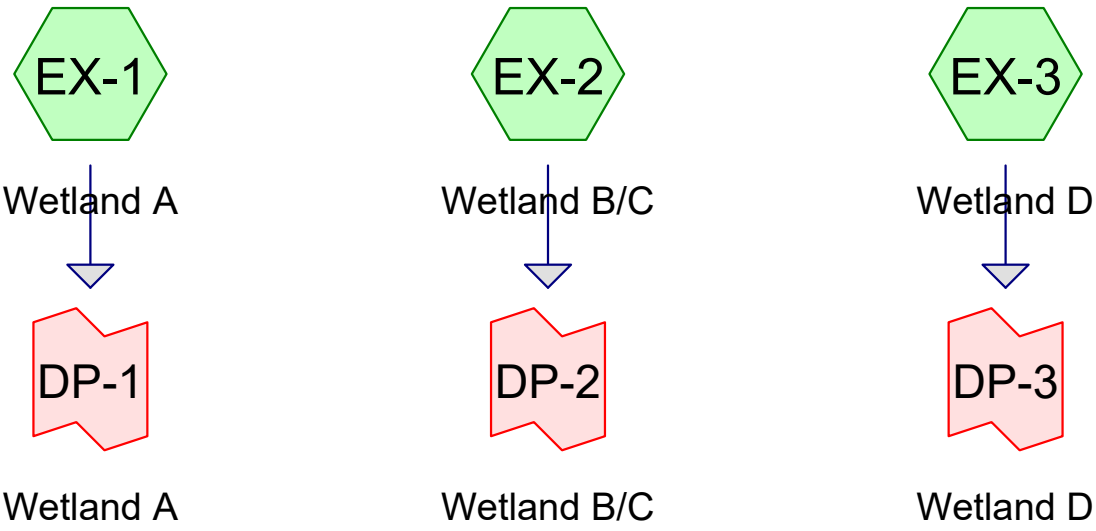
HydroCAD Analysis: Existing Conditions



Subcat Reach Pond Link

Routing Diagram for 15225.02_EX Drainage
Prepared by VHB, Printed 08/03/21

Rainfall Events Listing

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	2-Years	Type III 24-hr		Default	24.00	1	3.40	2
2	10-Years	Type III 24-hr		Default	24.00	1	5.07	2
3	25-Years	Type III 24-hr		Default	24.00	1	6.11	2
4	100-Years	Type III 24-hr		Default	24.00	1	7.71	2

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.399	39	>75% Grass cover, Good, HSG A (EX-3)
0.281	74	>75% Grass cover, Good, HSG C (EX-3)
0.017	89	Dirt roads, HSG D (EX-2)
3.426	30	Woods, Good, HSG A (EX-2, EX-3)
16.998	70	Woods, Good, HSG C (EX-1, EX-2, EX-3)
15.404	77	Woods, Good, HSG D (EX-1, EX-2, EX-3)
36.525	**69**	**TOTAL AREA**

2-Year Storm Event – Existing

Time span=0.00-72.00 hrs, dt=0.05 hrs, 1441 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment EX-1: Wetland A Runoff Area=9.602 ac 0.00% Impervious Runoff Depth=1.06"
Flow Length=404' Tc=32.6 min CN=72 Runoff=6.05 cfs 0.845 af

Subcatchment EX-2: Wetland B/C Runoff Area=19.266 ac 0.00% Impervious Runoff Depth=1.11"
Flow Length=491' Tc=32.2 min CN=73 Runoff=13.00 cfs 1.787 af

Subcatchment EX-3: Wetland D Runoff Area=7.657 ac 0.00% Impervious Runoff Depth=0.28"
Flow Length=763' Tc=24.6 min CN=54 Runoff=0.73 cfs 0.180 af

Link DP-1: Wetland A Inflow=6.05 cfs 0.845 af
Primary=6.05 cfs 0.845 af

Link DP-2: Wetland B/C Inflow=13.00 cfs 1.787 af
Primary=13.00 cfs 1.787 af

Link DP-3: Wetland D Inflow=0.73 cfs 0.180 af
Primary=0.73 cfs 0.180 af

Total Runoff Area = 36.525 ac Runoff Volume = 2.812 af Average Runoff Depth = 0.92"
100.00% Pervious = 36.525 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment EX-1: Wetland A

Runoff = 6.05 cfs @ 12.50 hrs, Volume= 0.845 af, Depth= 1.06"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Years Rainfall=3.40"

Area (ac)	CN	Description
2.926	77	Woods, Good, HSG D
6.676	70	Woods, Good, HSG C
9.602	72	Weighted Average
9.602		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
20.8	50	0.0050	0.04		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.40"
11.8	354	0.0100	0.50		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
32.6	404	Total			

Summary for Subcatchment EX-2: Wetland B/C

Runoff = 13.00 cfs @ 12.49 hrs, Volume= 1.787 af, Depth= 1.11"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Years Rainfall=3.40"

Area (ac)	CN	Description
0.594	30	Woods, Good, HSG A
6.797	70	Woods, Good, HSG C
11.858	77	Woods, Good, HSG D
0.017	89	Dirt roads, HSG D
19.266	73	Weighted Average
19.266		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
22.8	50	0.0040	0.04		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.40"
9.4	441	0.0245	0.78		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
32.2	491	Total			

Summary for Subcatchment EX-3: Wetland D

Runoff = 0.73 cfs @ 12.60 hrs, Volume= 0.180 af, Depth= 0.28"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Years Rainfall=3.40"

Area (ac)	CN	Description
0.399	39	>75% Grass cover, Good, HSG A
0.281	74	>75% Grass cover, Good, HSG C
2.832	30	Woods, Good, HSG A
3.525	70	Woods, Good, HSG C
0.620	77	Woods, Good, HSG D
7.657	54	Weighted Average
7.657		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.0	50	0.0200	0.07		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.40"
12.6	713	0.0358	0.95		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
24.6	763	Total			

Summary for Link DP-1: Wetland A

Inflow Area = 9.602 ac, 0.00% Impervious, Inflow Depth = 1.06" for 2-Years event
Inflow = 6.05 cfs @ 12.50 hrs, Volume= 0.845 af
Primary = 6.05 cfs @ 12.50 hrs, Volume= 0.845 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Summary for Link DP-2: Wetland B/C

Inflow Area = 19.266 ac, 0.00% Impervious, Inflow Depth = 1.11" for 2-Years event
Inflow = 13.00 cfs @ 12.49 hrs, Volume= 1.787 af
Primary = 13.00 cfs @ 12.49 hrs, Volume= 1.787 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Summary for Link DP-3: Wetland D

Inflow Area = 7.657 ac, 0.00% Impervious, Inflow Depth = 0.28" for 2-Years event
Inflow = 0.73 cfs @ 12.60 hrs, Volume= 0.180 af
Primary = 0.73 cfs @ 12.60 hrs, Volume= 0.180 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

10-Year Storm Event – Existing

Time span=0.00-72.00 hrs, dt=0.05 hrs, 1441 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment EX-1: Wetland A Runoff Area=9.602 ac 0.00% Impervious Runoff Depth=2.25"
Flow Length=404' Tc=32.6 min CN=72 Runoff=13.61 cfs 1.802 af

Subcatchment EX-2: Wetland B/C Runoff Area=19.266 ac 0.00% Impervious Runoff Depth=2.34"
Flow Length=491' Tc=32.2 min CN=73 Runoff=28.55 cfs 3.750 af

Subcatchment EX-3: Wetland D Runoff Area=7.657 ac 0.00% Impervious Runoff Depth=0.95"
Flow Length=763' Tc=24.6 min CN=54 Runoff=4.17 cfs 0.608 af

Link DP-1: Wetland A Inflow=13.61 cfs 1.802 af
Primary=13.61 cfs 1.802 af

Link DP-2: Wetland B/C Inflow=28.55 cfs 3.750 af
Primary=28.55 cfs 3.750 af

Link DP-3: Wetland D Inflow=4.17 cfs 0.608 af
Primary=4.17 cfs 0.608 af

Total Runoff Area = 36.525 ac Runoff Volume = 6.160 af Average Runoff Depth = 2.02"
100.00% Pervious = 36.525 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment EX-1: Wetland A

Runoff = 13.61 cfs @ 12.47 hrs, Volume= 1.802 af, Depth= 2.25"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Years Rainfall=5.07"

Area (ac)	CN	Description
2.926	77	Woods, Good, HSG D
6.676	70	Woods, Good, HSG C
9.602	72	Weighted Average
9.602		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
20.8	50	0.0050	0.04		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.40"
11.8	354	0.0100	0.50		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
32.6	404	Total			

Summary for Subcatchment EX-2: Wetland B/C

Runoff = 28.55 cfs @ 12.46 hrs, Volume= 3.750 af, Depth= 2.34"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Years Rainfall=5.07"

Area (ac)	CN	Description
0.594	30	Woods, Good, HSG A
6.797	70	Woods, Good, HSG C
11.858	77	Woods, Good, HSG D
0.017	89	Dirt roads, HSG D
19.266	73	Weighted Average
19.266		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
22.8	50	0.0040	0.04		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.40"
9.4	441	0.0245	0.78		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
32.2	491	Total			

Summary for Subcatchment EX-3: Wetland D

Runoff = 4.17 cfs @ 12.43 hrs, Volume= 0.608 af, Depth= 0.95"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Years Rainfall=5.07"

Area (ac)	CN	Description
0.399	39	>75% Grass cover, Good, HSG A
0.281	74	>75% Grass cover, Good, HSG C
2.832	30	Woods, Good, HSG A
3.525	70	Woods, Good, HSG C
0.620	77	Woods, Good, HSG D
7.657	54	Weighted Average
7.657		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.0	50	0.0200	0.07		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.40"
12.6	713	0.0358	0.95		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
24.6	763	Total			

Summary for Link DP-1: Wetland A

Inflow Area = 9.602 ac, 0.00% Impervious, Inflow Depth = 2.25" for 10-Years event
Inflow = 13.61 cfs @ 12.47 hrs, Volume= 1.802 af
Primary = 13.61 cfs @ 12.47 hrs, Volume= 1.802 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Summary for Link DP-2: Wetland B/C

Inflow Area = 19.266 ac, 0.00% Impervious, Inflow Depth = 2.34" for 10-Years event
Inflow = 28.55 cfs @ 12.46 hrs, Volume= 3.750 af
Primary = 28.55 cfs @ 12.46 hrs, Volume= 3.750 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Summary for Link DP-3: Wetland D

Inflow Area = 7.657 ac, 0.00% Impervious, Inflow Depth = 0.95" for 10-Years event
Inflow = 4.17 cfs @ 12.43 hrs, Volume= 0.608 af
Primary = 4.17 cfs @ 12.43 hrs, Volume= 0.608 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

25-Year Storm Event – Existing

Time span=0.00-72.00 hrs, dt=0.05 hrs, 1441 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment EX-1: Wetland A Runoff Area=9.602 ac 0.00% Impervious Runoff Depth=3.08"
Flow Length=404' Tc=32.6 min CN=72 Runoff=18.80 cfs 2.467 af

Subcatchment EX-2: Wetland B/C Runoff Area=19.266 ac 0.00% Impervious Runoff Depth=3.18"
Flow Length=491' Tc=32.2 min CN=73 Runoff=39.16 cfs 5.106 af

Subcatchment EX-3: Wetland D Runoff Area=7.657 ac 0.00% Impervious Runoff Depth=1.50"
Flow Length=763' Tc=24.6 min CN=54 Runoff=7.29 cfs 0.959 af

Link DP-1: Wetland A Inflow=18.80 cfs 2.467 af
Primary=18.80 cfs 2.467 af

Link DP-2: Wetland B/C Inflow=39.16 cfs 5.106 af
Primary=39.16 cfs 5.106 af

Link DP-3: Wetland D Inflow=7.29 cfs 0.959 af
Primary=7.29 cfs 0.959 af

Total Runoff Area = 36.525 ac Runoff Volume = 8.531 af Average Runoff Depth = 2.80"
100.00% Pervious = 36.525 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment EX-1: Wetland A

Runoff = 18.80 cfs @ 12.46 hrs, Volume= 2.467 af, Depth= 3.08"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Years Rainfall=6.11"

Area (ac)	CN	Description
2.926	77	Woods, Good, HSG D
6.676	70	Woods, Good, HSG C
9.602	72	Weighted Average
9.602		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
20.8	50	0.0050	0.04		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.40"
11.8	354	0.0100	0.50		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
32.6	404	Total			

Summary for Subcatchment EX-2: Wetland B/C

Runoff = 39.16 cfs @ 12.45 hrs, Volume= 5.106 af, Depth= 3.18"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Years Rainfall=6.11"

Area (ac)	CN	Description
0.594	30	Woods, Good, HSG A
6.797	70	Woods, Good, HSG C
11.858	77	Woods, Good, HSG D
0.017	89	Dirt roads, HSG D
19.266	73	Weighted Average
19.266		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
22.8	50	0.0040	0.04		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.40"
9.4	441	0.0245	0.78		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
32.2	491	Total			

Summary for Subcatchment EX-3: Wetland D

Runoff = 7.29 cfs @ 12.40 hrs, Volume= 0.959 af, Depth= 1.50"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Years Rainfall=6.11"

Area (ac)	CN	Description
0.399	39	>75% Grass cover, Good, HSG A
0.281	74	>75% Grass cover, Good, HSG C
2.832	30	Woods, Good, HSG A
3.525	70	Woods, Good, HSG C
0.620	77	Woods, Good, HSG D
7.657	54	Weighted Average
7.657		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.0	50	0.0200	0.07		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.40"
12.6	713	0.0358	0.95		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
24.6	763	Total			

Summary for Link DP-1: Wetland A

Inflow Area = 9.602 ac, 0.00% Impervious, Inflow Depth = 3.08" for 25-Years event
Inflow = 18.80 cfs @ 12.46 hrs, Volume= 2.467 af
Primary = 18.80 cfs @ 12.46 hrs, Volume= 2.467 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Summary for Link DP-2: Wetland B/C

Inflow Area = 19.266 ac, 0.00% Impervious, Inflow Depth = 3.18" for 25-Years event
Inflow = 39.16 cfs @ 12.45 hrs, Volume= 5.106 af
Primary = 39.16 cfs @ 12.45 hrs, Volume= 5.106 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Summary for Link DP-3: Wetland D

Inflow Area = 7.657 ac, 0.00% Impervious, Inflow Depth = 1.50" for 25-Years event
Inflow = 7.29 cfs @ 12.40 hrs, Volume= 0.959 af
Primary = 7.29 cfs @ 12.40 hrs, Volume= 0.959 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

100-Year Storm Event – Existing

Time span=0.00-72.00 hrs, dt=0.05 hrs, 1441 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment EX-1: Wetland A Runoff Area=9.602 ac 0.00% Impervious Runoff Depth=4.44"
Flow Length=404' Tc=32.6 min CN=72 Runoff=27.16 cfs 3.553 af

Subcatchment EX-2: Wetland B/C Runoff Area=19.266 ac 0.00% Impervious Runoff Depth=4.55"
Flow Length=491' Tc=32.2 min CN=73 Runoff=56.16 cfs 7.311 af

Subcatchment EX-3: Wetland D Runoff Area=7.657 ac 0.00% Impervious Runoff Depth=2.48"
Flow Length=763' Tc=24.6 min CN=54 Runoff=12.95 cfs 1.585 af

Link DP-1: Wetland A Inflow=27.16 cfs 3.553 af
Primary=27.16 cfs 3.553 af

Link DP-2: Wetland B/C Inflow=56.16 cfs 7.311 af
Primary=56.16 cfs 7.311 af

Link DP-3: Wetland D Inflow=12.95 cfs 1.585 af
Primary=12.95 cfs 1.585 af

Total Runoff Area = 36.525 ac Runoff Volume = 12.450 af Average Runoff Depth = 4.09"
100.00% Pervious = 36.525 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment EX-1: Wetland A

Runoff = 27.16 cfs @ 12.45 hrs, Volume= 3.553 af, Depth= 4.44"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Years Rainfall=7.71"

Area (ac)	CN	Description
2.926	77	Woods, Good, HSG D
6.676	70	Woods, Good, HSG C
9.602	72	Weighted Average
9.602		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
20.8	50	0.0050	0.04		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.40"
11.8	354	0.0100	0.50		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
32.6	404	Total			

Summary for Subcatchment EX-2: Wetland B/C

Runoff = 56.16 cfs @ 12.45 hrs, Volume= 7.311 af, Depth= 4.55"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Years Rainfall=7.71"

Area (ac)	CN	Description
0.594	30	Woods, Good, HSG A
6.797	70	Woods, Good, HSG C
11.858	77	Woods, Good, HSG D
0.017	89	Dirt roads, HSG D
19.266	73	Weighted Average
19.266		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
22.8	50	0.0040	0.04		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.40"
9.4	441	0.0245	0.78		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
32.2	491	Total			

Summary for Subcatchment EX-3: Wetland D

Runoff = 12.95 cfs @ 12.37 hrs, Volume= 1.585 af, Depth= 2.48"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Years Rainfall=7.71"

Area (ac)	CN	Description
0.399	39	>75% Grass cover, Good, HSG A
0.281	74	>75% Grass cover, Good, HSG C
2.832	30	Woods, Good, HSG A
3.525	70	Woods, Good, HSG C
0.620	77	Woods, Good, HSG D
7.657	54	Weighted Average
7.657		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.0	50	0.0200	0.07		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.40"
12.6	713	0.0358	0.95		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
24.6	763	Total			

Summary for Link DP-1: Wetland A

Inflow Area = 9.602 ac, 0.00% Impervious, Inflow Depth = 4.44" for 100-Years event
Inflow = 27.16 cfs @ 12.45 hrs, Volume= 3.553 af
Primary = 27.16 cfs @ 12.45 hrs, Volume= 3.553 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Summary for Link DP-2: Wetland B/C

Inflow Area = 19.266 ac, 0.00% Impervious, Inflow Depth = 4.55" for 100-Years event
Inflow = 56.16 cfs @ 12.45 hrs, Volume= 7.311 af
Primary = 56.16 cfs @ 12.45 hrs, Volume= 7.311 af, Atten= 0%, Lag= 0.0 min

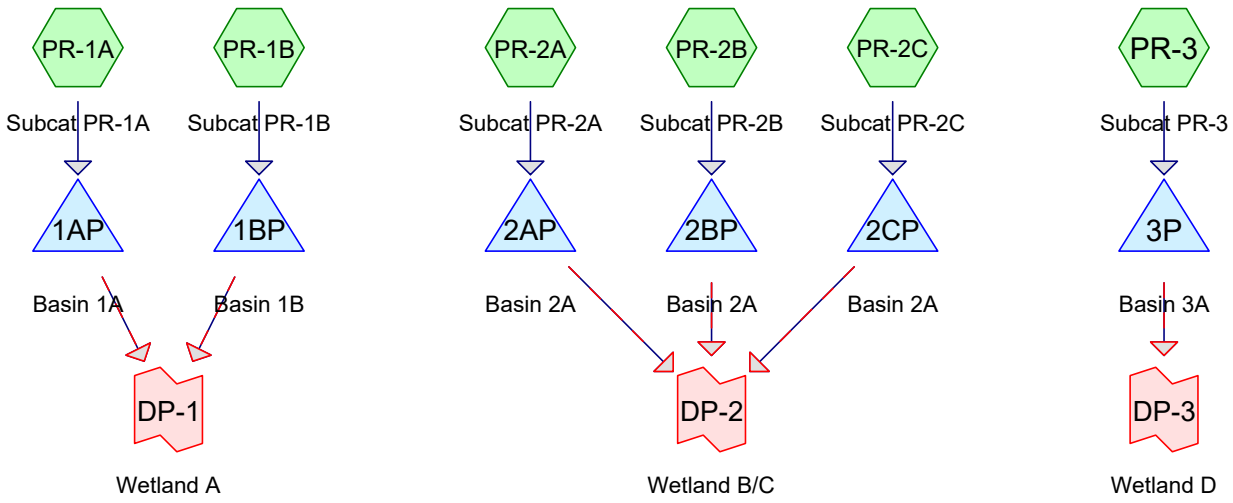
Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Summary for Link DP-3: Wetland D

Inflow Area = 7.657 ac, 0.00% Impervious, Inflow Depth = 2.48" for 100-Years event
Inflow = 12.95 cfs @ 12.37 hrs, Volume= 1.585 af
Primary = 12.95 cfs @ 12.37 hrs, Volume= 1.585 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

HydroCAD Analysis: Proposed Conditions



Subcat Reach Pond Link

Routing Diagram for 15225.02_PR Drainage
Prepared by VHB, Printed 8/5/2021

Rainfall Events Listing

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	2-Years	Type III 24-hr		Default	24.00	1	3.40	2
2	10-Years	Type III 24-hr		Default	24.00	1	5.07	2
3	25-Years	Type III 24-hr		Default	24.00	1	6.11	2
4	100-Years	Type III 24-hr		Default	24.00	1	7.71	2

2-Year Storm Event – Proposed

Summary for Subcatchment PR-1A: Subcat PR-1A

Runoff = 5.73 cfs @ 12.48 hrs, Volume= 0.771 af, Depth= 1.49"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Years Rainfall=3.40"

Area (ac)	CN	Description
2.056	71	Meadow, non-grazed, HSG C
0.825	78	Meadow, non-grazed, HSG D
1.525	98	Water Surface, 0% imp, HSG D
0.712	70	Woods, Good, HSG C
1.096	77	Woods, Good, HSG D
6.214	79	Weighted Average
6.214		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.9	50	0.0047	0.05		**Sheet Flow, meadow** n= 0.320 P2= 3.40"
13.1	291	0.0100	0.37		**Shallow Concentrated Flow, meadow** Kv= 3.7 fps
2.6	63	0.0064	0.40		**Shallow Concentrated Flow, woods** Woodland Kv= 5.0 fps
33.6	404	Total			

Summary for Subcatchment PR-1B: Subcat PR-1B

Runoff = 2.62 cfs @ 12.35 hrs, Volume= 0.315 af, Depth= 1.06"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Years Rainfall=3.40"

Area (ac)	CN	Description
2.836	71	Meadow, non-grazed, HSG C
0.033	78	Meadow, non-grazed, HSG D
0.074	89	Gravel roads, HSG C
0.039	91	Gravel roads, HSG D
0.271	70	Woods, Good, HSG C
0.329	77	Woods, Good, HSG D
3.582	72	Weighted Average
3.582		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.2	50	0.0100	0.06		**Sheet Flow, meadow** n= 0.320 P2= 3.40"
9.9	332	0.0226	0.56		**Shallow Concentrated Flow, meadow** Kv= 3.7 fps
23.1	382	Total			

Summary for Subcatchment PR-2A: Subcat PR-2A

Runoff = 6.26 cfs @ 12.43 hrs, Volume= 0.795 af, Depth= 1.49"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Years Rainfall=3.40"

Area (ac)	CN	Description
0.462	71	Meadow, non-grazed, HSG C
2.895	78	Meadow, non-grazed, HSG D
0.027	89	Gravel roads, HSG C
0.456	91	Gravel roads, HSG D
0.424	98	Water Surface, 0% imp, HSG D
0.040	70	Woods, Good, HSG C
2.107	77	Woods, Good, HSG D
6.411	79	Weighted Average
6.411		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.2	50	0.0060	0.05		**Sheet Flow, meadow** n= 0.320 P2= 3.40"
10.5	324	0.0192	0.51		**Shallow Concentrated Flow, meadow** Kv= 3.7 fps
0.2	20	0.0100	1.61		**Shallow Concentrated Flow, gravel** Unpaved Kv= 16.1 fps
2.8	138	0.0029	0.81		**Shallow Concentrated Flow, basin** Grassed Waterway Kv= 15.0 fps
29.7	532	Total			

Summary for Subcatchment PR-2B: Subcat PR-2B

Runoff = 9.82 cfs @ 12.26 hrs, Volume= 1.020 af, Depth= 1.36"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Years Rainfall=3.40"

	Area (ac)	CN	Description
	2.512	78	Meadow, non-grazed, HSG D
	2.085	71	Meadow, non-grazed, HSG C
	0.334	91	Gravel roads, HSG D
*	0.289	98	Water Surface, 0% imp
	2.813	77	Woods, Good, HSG D
	0.253	89	Gravel roads, HSG C
	0.736	70	Woods, Good, HSG C
	9.022	77	Weighted Average
	9.022		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.5	50	0.0300	0.10		**Sheet Flow, meadow** n= 0.320 P2= 3.40"
7.7	227	0.0176	0.49		**Shallow Concentrated Flow, meadow** Kv= 3.7 fps
0.4	66	0.0379	3.13		**Shallow Concentrated Flow, gravel** Unpaved Kv= 16.1 fps
1.4	65	0.0460	0.79		**Shallow Concentrated Flow, meadow** Kv= 3.7 fps
18.0	408	Total			

Summary for Subcatchment PR-2C: Subcat PR-2C

Runoff = 2.02 cfs @ 12.27 hrs, Volume= 0.235 af, Depth= 0.79"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Years Rainfall=3.40"

	Area (ac)	CN	Description
	0.049	30	Meadow, non-grazed, HSG A
	1.213	71	Meadow, non-grazed, HSG C
	0.026	78	Meadow, non-grazed, HSG D
	0.071	76	Gravel roads, HSG A
	0.050	91	Gravel roads, HSG D
*	0.115	98	Water Surface, 0% imp
	0.477	30	Woods, Good, HSG A
	1.320	70	Woods, Good, HSG C
	0.033	77	Woods, Good, HSG D
	0.191	89	Gravel roads, HSG C
	3.545	67	Weighted Average
	3.545		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.4	50	0.0600	0.13		**Sheet Flow, meadow** n= 0.320 P2= 3.40"
9.8	380	0.0302	0.64		**Shallow Concentrated Flow, meadow** Kv= 3.7 fps
1.0	50	0.0300	0.87		**Shallow Concentrated Flow, meadow** Woodland Kv= 5.0 fps
17.2	480	Total			

Summary for Subcatchment PR-3: Subcat PR-3

Runoff = 1.22 cfs @ 12.55 hrs, Volume= 0.245 af, Depth= 0.38"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Years Rainfall=3.40"

Area (ac)	CN	Description
2.017	30	Meadow, non-grazed, HSG A
2.272	71	Meadow, non-grazed, HSG C
0.061	78	Meadow, non-grazed, HSG D
0.131	76	Gravel roads, HSG A
0.251	89	Gravel roads, HSG C
0.505	98	Water Surface, 0% imp, HSG C
1.085	30	Woods, Good, HSG A
0.885	70	Woods, Good, HSG C
0.544	77	Woods, Good, HSG D
7.751	57	Weighted Average
7.751		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.9	50	0.0167	0.06		**Sheet Flow, woods** Woods: Light underbrush n= 0.400 P2= 3.40"
0.8	35	0.0220	0.74		**Shallow Concentrated Flow, woods** Woodland Kv= 5.0 fps
10.8	496	0.0425	0.76		**Shallow Concentrated Flow, meadow** Kv= 3.7 fps
0.1	21	0.0225	2.42		**Shallow Concentrated Flow, gravel** Unpaved Kv= 16.1 fps
1.6	25	0.0050	0.26		**Shallow Concentrated Flow, meadow** Kv= 3.7 fps
26.2	627	Total			

Summary for Pond 1AP: Basin 1A

Inflow Area = 6.214 ac, 0.00% Impervious, Inflow Depth = 1.49" for 2-Years event
Inflow = 5.73 cfs @ 12.48 hrs, Volume= 0.771 af
Outflow = 1.84 cfs @ 13.19 hrs, Volume= 0.694 af, Atten= 68%, Lag= 42.5 min
Primary = 1.84 cfs @ 13.19 hrs, Volume= 0.694 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 69.52' @ 13.19 hrs Surf.Area= 28,395 sf Storage= 15,273 cf

Plug-Flow detention time= 668.2 min calculated for 0.694 af (90% of inflow)
Center-of-Mass det. time= 621.6 min (1,489.9 - 868.4)

Volume	Invert	Avail.Storage	Storage Description
#1	68.90'	49,093 cf	**Custom Stage Data (Prismatic)** Listed below

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
68.90	500	0	0
69.00	14,500	750	750
70.00	41,093	27,797	28,546
70.50	41,093	20,547	49,093

Device	Routing	Invert	Outlet Devices
#1	Primary	66.10'	**12.0" Round Culvert** L= 25.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 66.10' / 65.90' S= 0.0080 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Device 1	69.40'	**48.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Device 1	68.90'	**2.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Secondary	69.90'	**15.0' long x 6.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.37 2.51 2.70 2.68 2.68 2.67 2.65 2.65 2.65 2.65 2.66 2.66 2.67 2.69 2.72 2.76 2.83

Primary OutFlow Max=1.84 cfs @ 13.19 hrs HW=69.52' (Free Discharge)
└**1=Culvert** (Passes 1.84 cfs of 6.46 cfs potential flow)
  ├**2=Orifice/Grate** (Weir Controls 1.76 cfs @ 1.14 fps)
  └**3=Orifice/Grate** (Orifice Controls 0.08 cfs @ 3.54 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=68.90' (Free Discharge)
└**4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond 1BP: Basin 1B

Inflow Area = 3.582 ac, 0.00% Impervious, Inflow Depth = 1.06" for 2-Years event
Inflow = 2.62 cfs @ 12.35 hrs, Volume= 0.315 af
Outflow = 1.69 cfs @ 12.65 hrs, Volume= 0.315 af, Atten= 36%, Lag= 17.7 min
Primary = 1.69 cfs @ 12.65 hrs, Volume= 0.315 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 65.21' @ 12.65 hrs Surf.Area= 4,619 sf Storage= 2,707 cf

Plug-Flow detention time= 107.6 min calculated for 0.315 af (100% of inflow)
Center-of-Mass det. time= 107.1 min (987.7 - 880.6)

Volume	Invert	Avail.Storage	Storage Description
#1	64.30'	8,923 cf	**Custom Stage Data (Prismatic)** Listed below

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
64.30	250	0	0
65.00	4,363	1,615	1,615
66.40	6,077	7,308	8,923

Device	Routing	Invert	Outlet Devices
#1	Primary	64.30'	**10.0" Round Culvert** L= 23.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 64.30' / 64.10' S= 0.0087 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.55 sf
#2	Device 1	64.90'	**48.0" Horiz. Orifice/Grate** C= 0.600

Limited to weir flow at low heads

#3	Device 1	64.30'	**2.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Secondary	65.90'	**20.0' long x 8.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.43 2.54 2.70 2.69 2.68 2.68 2.66 2.64 2.64 2.64 2.65 2.65 2.66 2.66 2.68 2.70 2.74

Primary OutFlow Max=1.69 cfs @ 12.65 hrs HW=65.21' (Free Discharge)
└**1=Culvert** (Barrel Controls 1.69 cfs @ 3.53 fps)
  └**2=Orifice/Grate** (Passes < 7.07 cfs potential flow)
  └**3=Orifice/Grate** (Passes < 0.10 cfs potential flow)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=64.30' (Free Discharge)
└**4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond 2AP: Basin 2A

Inflow Area =	6.411 ac,	0.00% Impervious,	Inflow Depth =	1.49" for 2-Years event
Inflow =	6.26 cfs @	12.43 hrs,	Volume=	0.795 af
Outflow =	1.95 cfs @	13.10 hrs,	Volume=	0.795 af, Atten= 69%, Lag= 40.1 min
Primary =	1.95 cfs @	13.10 hrs,	Volume=	0.795 af
Secondary =	0.00 cfs @	0.00 hrs,	Volume=	0.000 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 65.48' @ 13.10 hrs Surf.Area= 14,501 sf Storage= 13,297 cf

Plug-Flow detention time= 131.6 min calculated for 0.795 af (100% of inflow)
Center-of-Mass det. time= 131.6 min (996.4 - 864.8)

Volume	Invert	Avail.Storage	Storage Description
#1	64.00'	29,755 cf	**TP#2-1 (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
64.00	1	0	0
65.00	13,295	6,648	6,648
66.00	15,816	14,556	21,204
66.50	18,388	8,551	29,755

Device	Routing	Invert	Outlet Devices
#1	Primary	62.50'	**12.0" Round Culvert** L= 25.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 62.50' / 61.90' S= 0.0240 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Device 1	65.40'	**48.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Device 1	64.00'	**6.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Secondary	66.00'	**15.0' long x 0.50' rise Sharp-Crested Rectangular Weir** 2 End Contraction(s) 0.9' Crest Height

Primary OutFlow Max=1.95 cfs @ 13.10 hrs HW=65.48' (Free Discharge)
└**1=Culvert** (Passes 1.95 cfs of 5.95 cfs potential flow)
  ├**2=Orifice/Grate** (Weir Controls 0.90 cfs @ 0.92 fps)
  └**3=Orifice/Grate** (Orifice Controls 1.05 cfs @ 5.34 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=64.00' (Free Discharge)
└**4=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond 2BP: Basin 2A

Inflow Area = 9.022 ac, 0.00% Impervious, Inflow Depth = 1.36" for 2-Years event
Inflow = 9.82 cfs @ 12.26 hrs, Volume= 1.020 af
Outflow = 6.52 cfs @ 12.51 hrs, Volume= 1.019 af, Atten= 34%, Lag= 15.0 min
Primary = 3.53 cfs @ 12.51 hrs, Volume= 0.943 af
Secondary = 2.98 cfs @ 12.51 hrs, Volume= 0.076 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 65.93' @ 12.51 hrs Surf.Area= 10,613 sf Storage= 13,781 cf

Plug-Flow detention time= 297.6 min calculated for 1.018 af (100% of inflow)
Center-of-Mass det. time= 298.5 min (1,158.6 - 860.1)

Volume	Invert	Avail.Storage	Storage Description
#1	64.00'	20,325 cf	**TP#3-1 (Prismatic)**Listed below

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
64.00	100	0	0
64.80	7,380	2,992	2,992
65.00	9,022	1,640	4,632
66.00	10,741	9,882	14,514
66.50	12,506	5,812	20,325

Device	Routing	Invert	Outlet Devices
#1	Primary	64.00'	**12.0" Round Culvert** L= 22.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 64.00' / 63.80' S= 0.0091 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Device 1	65.30'	**48.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Device 1	64.00'	**2.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Secondary	65.80'	**20.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s) 1.8' Crest Height

Primary OutFlow Max=3.51 cfs @ 12.51 hrs HW=65.92' (Free Discharge)
└**1=Culvert** (Passes 3.51 cfs of 4.51 cfs potential flow)
  ├**2=Orifice/Grate** (Orifice Controls 3.37 cfs @ 2.69 fps)
  └**3=Orifice/Grate** (Orifice Controls 0.14 cfs @ 6.53 fps)

Secondary OutFlow Max=2.89 cfs @ 12.51 hrs HW=65.92' (Free Discharge)
└**4=Sharp-Crested Rectangular Weir** (Weir Controls 2.89 cfs @ 1.16 fps)

Summary for Pond 2CP: Basin 2A

Inflow Area = 3.545 ac, 0.00% Impervious, Inflow Depth = 0.79" for 2-Years event
Inflow = 2.02 cfs @ 12.27 hrs, Volume= 0.235 af
Outflow = 0.44 cfs @ 13.12 hrs, Volume= 0.235 af, Atten= 78%, Lag= 51.0 min
Primary = 0.44 cfs @ 13.12 hrs, Volume= 0.235 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 66.27' @ 13.12 hrs Surf.Area= 3,444 sf Storage= 3,161 cf

Plug-Flow detention time= 79.4 min calculated for 0.235 af (100% of inflow)
Center-of-Mass det. time= 79.4 min (971.7 - 892.3)

Volume	Invert	Avail.Storage	Storage Description
#1	65.00'	8,141 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
65.00	150	0	0
65.50	2,818	742	742
66.00	3,209	1,507	2,249
67.00	4,064	3,637	5,885
67.50	4,960	2,256	8,141

Device	Routing	Invert	Outlet Devices
#1	Primary	65.00'	**12.0" Round Culvert** L= 25.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 65.00' / 64.90' S= 0.0040 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Device 1	66.30'	**48.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Device 1	65.00'	**4.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Secondary	66.80'	**25.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s) 1.9' Crest Height

Primary OutFlow Max=0.44 cfs @ 13.12 hrs HW=66.27' (Free Discharge)
└**1=Culvert** (Passes 0.44 cfs of 2.73 cfs potential flow)
  ├**2=Orifice/Grate** (Controls 0.00 cfs)
  └**3=Orifice/Grate** (Orifice Controls 0.44 cfs @ 5.07 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=65.00' (Free Discharge)
└**4=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond 3P: Basin 3A

Inflow Area = 7.751 ac, 0.00% Impervious, Inflow Depth = 0.38" for 2-Years event
Inflow = 1.22 cfs @ 12.55 hrs, Volume= 0.245 af
Outflow = 0.26 cfs @ 15.72 hrs, Volume= 0.245 af, Atten= 78%, Lag= 190.2 min
Primary = 0.26 cfs @ 15.72 hrs, Volume= 0.245 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 66.02' @ 15.72 hrs Surf.Area= 12,293 sf Storage= 3,710 cf

Plug-Flow detention time= 221.1 min calculated for 0.245 af (100% of inflow)
Center-of-Mass det. time= 220.9 min (1,169.3 - 948.4)

Volume	Invert	Avail.Storage	Storage Description
#1	65.50'	28,965 cf	**Custom Stage Data (Prismatic)** Listed below

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
65.50	100	0	0
66.10	14,230	4,299	4,299
67.00	18,245	14,614	18,913
67.50	21,965	10,053	28,965

Device	Routing	Invert	Outlet Devices
#1	Primary	65.30'	**10.0" Round Culvert** L= 22.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 65.30' / 65.10' S= 0.0091 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.55 sf
#2	Device 1	66.50'	**48.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Device 1	65.50'	**6.0" W x 2.0" H Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Secondary	66.90'	**5.0' long x 0.30' rise Sharp-Crested Rectangular Weir** 2 End Contraction(s) 2.4' Crest Height
#5	Primary	65.30'	**10.0" Round Culvert** L= 22.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 65.30' / 65.10' S= 0.0091 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.55 sf
#6	Device 5	66.50'	**48.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#7	Device 5	66.10'	**6.0" W x 2.0" H Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#8	Secondary	66.90'	**5.0' long x 0.30' rise Sharp-Crested Rectangular Weir** 2 End Contraction(s) 2.4' Crest Height

Primary OutFlow Max=0.26 cfs @ 15.72 hrs HW=66.02' (Free Discharge)
- **1=Culvert** (Passes 0.26 cfs of 1.23 cfs potential flow)
  - **2=Orifice/Grate** (Controls 0.00 cfs)
  - **3=Orifice/Grate** (Orifice Controls 0.26 cfs @ 3.17 fps)
- **5=Culvert** (Passes 0.00 cfs of 1.23 cfs potential flow)
  - **6=Orifice/Grate** (Controls 0.00 cfs)
  - **7=Orifice/Grate** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=65.50' (Free Discharge)
- **4=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)
- **8=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Link DP-1: Wetland A

Inflow Area = 9.796 ac, 0.00% Impervious, Inflow Depth > 1.24" for 2-Years event
Inflow = 3.12 cfs @ 13.08 hrs, Volume= 1.009 af
Primary = 3.12 cfs @ 13.08 hrs, Volume= 1.009 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Summary for Link DP-2: Wetland B/C

Inflow Area = 18.978 ac, 0.00% Impervious, Inflow Depth > 1.30" for 2-Years event
Inflow = 7.79 cfs @ 12.51 hrs, Volume= 2.049 af
Primary = 7.79 cfs @ 12.51 hrs, Volume= 2.049 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Summary for Link DP-3: Wetland D

Inflow Area = 7.751 ac, 0.00% Impervious, Inflow Depth > 0.38" for 2-Years event
Inflow = 0.26 cfs @ 15.72 hrs, Volume= 0.245 af
Primary = 0.26 cfs @ 15.72 hrs, Volume= 0.245 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

10-Year Storm Event – Proposed

Summary for Subcatchment PR-1A: Subcat PR-1A

Runoff = 11.17 cfs @ 12.47 hrs, Volume= 1.482 af, Depth= 2.86"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Years Rainfall=5.07"

Area (ac)	CN	Description
2.056	71	Meadow, non-grazed, HSG C
0.825	78	Meadow, non-grazed, HSG D
1.525	98	Water Surface, 0% imp, HSG D
0.712	70	Woods, Good, HSG C
1.096	77	Woods, Good, HSG D
6.214	79	Weighted Average
6.214		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.9	50	0.0047	0.05		**Sheet Flow, meadow** n= 0.320 P2= 3.40"
13.1	291	0.0100	0.37		**Shallow Concentrated Flow, meadow** Kv= 3.7 fps
2.6	63	0.0064	0.40		**Shallow Concentrated Flow, woods** Woodland Kv= 5.0 fps
33.6	404	Total			

Summary for Subcatchment PR-1B: Subcat PR-1B

Runoff = 5.91 cfs @ 12.33 hrs, Volume= 0.672 af, Depth= 2.25"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Years Rainfall=5.07"

Area (ac)	CN	Description
2.836	71	Meadow, non-grazed, HSG C
0.033	78	Meadow, non-grazed, HSG D
0.074	89	Gravel roads, HSG C
0.039	91	Gravel roads, HSG D
0.271	70	Woods, Good, HSG C
0.329	77	Woods, Good, HSG D
3.582	72	Weighted Average
3.582		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.2	50	0.0100	0.06		**Sheet Flow, meadow** n= 0.320 P2= 3.40"
9.9	332	0.0226	0.56		**Shallow Concentrated Flow, meadow** Kv= 3.7 fps
23.1	382	Total			

Summary for Subcatchment PR-2A: Subcat PR-2A

Runoff = 12.20 cfs @ 12.41 hrs, Volume= 1.529 af, Depth= 2.86"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Years Rainfall=5.07"

Area (ac)	CN	Description
0.462	71	Meadow, non-grazed, HSG C
2.895	78	Meadow, non-grazed, HSG D
0.027	89	Gravel roads, HSG C
0.456	91	Gravel roads, HSG D
0.424	98	Water Surface, 0% imp, HSG D
0.040	70	Woods, Good, HSG C
2.107	77	Woods, Good, HSG D
6.411	79	Weighted Average
6.411		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.2	50	0.0060	0.05		**Sheet Flow, meadow** n= 0.320 P2= 3.40"
10.5	324	0.0192	0.51		**Shallow Concentrated Flow, meadow** Kv= 3.7 fps
0.2	20	0.0100	1.61		**Shallow Concentrated Flow, gravel** Unpaved Kv= 16.1 fps
2.8	138	0.0029	0.81		**Shallow Concentrated Flow, basin** Grassed Waterway Kv= 15.0 fps
29.7	532	Total			

Summary for Subcatchment PR-2B: Subcat PR-2B

Runoff = 19.88 cfs @ 12.25 hrs, Volume= 2.016 af, Depth= 2.68"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Years Rainfall=5.07"

	Area (ac)	CN	Description
	2.512	78	Meadow, non-grazed, HSG D
	2.085	71	Meadow, non-grazed, HSG C
	0.334	91	Gravel roads, HSG D
*	0.289	98	Water Surface, 0% imp
	2.813	77	Woods, Good, HSG D
	0.253	89	Gravel roads, HSG C
	0.736	70	Woods, Good, HSG C
	9.022	77	Weighted Average
	9.022		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.5	50	0.0300	0.10		**Sheet Flow, meadow** n= 0.320 P2= 3.40"
7.7	227	0.0176	0.49		**Shallow Concentrated Flow, meadow** Kv= 3.7 fps
0.4	66	0.0379	3.13		**Shallow Concentrated Flow, gravel** Unpaved Kv= 16.1 fps
1.4	65	0.0460	0.79		**Shallow Concentrated Flow, meadow** Kv= 3.7 fps
18.0	408	Total			

Summary for Subcatchment PR-2C: Subcat PR-2C

Runoff = 5.29 cfs @ 12.25 hrs, Volume= 0.547 af, Depth= 1.85"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Years Rainfall=5.07"

	Area (ac)	CN	Description
	0.049	30	Meadow, non-grazed, HSG A
	1.213	71	Meadow, non-grazed, HSG C
	0.026	78	Meadow, non-grazed, HSG D
	0.071	76	Gravel roads, HSG A
	0.050	91	Gravel roads, HSG D
*	0.115	98	Water Surface, 0% imp
	0.477	30	Woods, Good, HSG A
	1.320	70	Woods, Good, HSG C
	0.033	77	Woods, Good, HSG D
	0.191	89	Gravel roads, HSG C
	3.545	67	Weighted Average
	3.545		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.4	50	0.0600	0.13		**Sheet Flow, meadow** n= 0.320 P2= 3.40"
9.8	380	0.0302	0.64		**Shallow Concentrated Flow, meadow** Kv= 3.7 fps
1.0	50	0.0300	0.87		**Shallow Concentrated Flow, meadow** Woodland Kv= 5.0 fps
17.2	480	Total			

Summary for Subcatchment PR-3: Subcat PR-3

Runoff = 5.31 cfs @ 12.43 hrs, Volume= 0.738 af, Depth= 1.14"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Years Rainfall=5.07"

Area (ac)	CN	Description
2.017	30	Meadow, non-grazed, HSG A
2.272	71	Meadow, non-grazed, HSG C
0.061	78	Meadow, non-grazed, HSG D
0.131	76	Gravel roads, HSG A
0.251	89	Gravel roads, HSG C
0.505	98	Water Surface, 0% imp, HSG C
1.085	30	Woods, Good, HSG A
0.885	70	Woods, Good, HSG C
0.544	77	Woods, Good, HSG D
7.751	57	Weighted Average
7.751		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.9	50	0.0167	0.06		**Sheet Flow, woods** Woods: Light underbrush n= 0.400 P2= 3.40"
0.8	35	0.0220	0.74		**Shallow Concentrated Flow, woods** Woodland Kv= 5.0 fps
10.8	496	0.0425	0.76		**Shallow Concentrated Flow, meadow** Kv= 3.7 fps
0.1	21	0.0225	2.42		**Shallow Concentrated Flow, gravel** Unpaved Kv= 16.1 fps
1.6	25	0.0050	0.26		**Shallow Concentrated Flow, meadow** Kv= 3.7 fps
26.2	627	Total			

Summary for Pond 1AP: Basin 1A

Inflow Area = 6.214 ac, 0.00% Impervious, Inflow Depth = 2.86" for 10-Years event
Inflow = 11.17 cfs @ 12.47 hrs, Volume= 1.482 af
Outflow = 6.71 cfs @ 12.83 hrs, Volume= 1.404 af, Atten= 40%, Lag= 21.8 min
Primary = 6.71 cfs @ 12.83 hrs, Volume= 1.404 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 69.75' @ 12.83 hrs Surf.Area= 34,442 sf Storage= 21,595 cf

Plug-Flow detention time= 355.5 min calculated for 1.404 af (95% of inflow)
Center-of-Mass det. time= 326.9 min (1,176.3 - 849.4)

Volume	Invert	Avail.Storage	Storage Description
#1	68.90'	49,093 cf	**Custom Stage Data (Prismatic)** Listed below

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
68.90	500	0	0
69.00	14,500	750	750
70.00	41,093	27,797	28,546
70.50	41,093	20,547	49,093

Device	Routing	Invert	Outlet Devices
#1	Primary	66.10'	**12.0" Round Culvert** L= 25.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 66.10' / 65.90' S= 0.0080 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Device 1	69.40'	**48.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Device 1	68.90'	**2.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Secondary	69.90'	**15.0' long x 6.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.37 2.51 2.70 2.68 2.68 2.67 2.65 2.65 2.65 2.65 2.66 2.66 2.67 2.69 2.72 2.76 2.83

Primary OutFlow Max=6.71 cfs @ 12.83 hrs HW=69.75' (Free Discharge)
└**1=Culvert** (Inlet Controls 6.71 cfs @ 8.54 fps)
  ├**2=Orifice/Grate** (Passes < 8.49 cfs potential flow)
  └**3=Orifice/Grate** (Passes < 0.09 cfs potential flow)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=68.90' (Free Discharge)
└**4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond 1BP: Basin 1B

Inflow Area = 3.582 ac, 0.00% Impervious, Inflow Depth = 2.25" for 10-Years event
Inflow = 5.91 cfs @ 12.33 hrs, Volume= 0.672 af
Outflow = 3.82 cfs @ 12.62 hrs, Volume= 0.672 af, Atten= 35%, Lag= 17.2 min
Primary = 2.87 cfs @ 12.62 hrs, Volume= 0.657 af
Secondary = 0.95 cfs @ 12.62 hrs, Volume= 0.015 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 65.97' @ 12.62 hrs Surf.Area= 5,553 sf Storage= 6,690 cf

Plug-Flow detention time= 64.6 min calculated for 0.672 af (100% of inflow)
Center-of-Mass det. time= 64.3 min (921.9 - 857.7)

Volume	Invert	Avail.Storage	Storage Description
#1	64.30'	8,923 cf	**Custom Stage Data (Prismatic)** Listed below

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
64.30	250	0	0
65.00	4,363	1,615	1,615
66.40	6,077	7,308	8,923

Device	Routing	Invert	Outlet Devices
#1	Primary	64.30'	**10.0" Round Culvert** L= 23.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 64.30' / 64.10' S= 0.0087 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.55 sf
#2	Device 1	64.90'	**48.0" Horiz. Orifice/Grate** C= 0.600

			Limited to weir flow at low heads
#3	Device 1	64.30'	**2.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Secondary	65.90'	**20.0' long x 8.0' breadth Broad-Crested Rectangular Weir**
			Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50
			Coef. (English) 2.43 2.54 2.70 2.69 2.68 2.68 2.66 2.64 2.64 2.64 2.65 2.65 2.66 2.66 2.68 2.70 2.74

Primary OutFlow Max=2.86 cfs @ 12.62 hrs HW=65.97' (Free Discharge)
└**1=Culvert** (Barrel Controls 2.86 cfs @ 5.25 fps)
  └**2=Orifice/Grate** (Passes < 45.47 cfs potential flow)
  └**3=Orifice/Grate** (Passes < 0.13 cfs potential flow)

Secondary OutFlow Max=0.90 cfs @ 12.62 hrs HW=65.97' (Free Discharge)
└**4=Broad-Crested Rectangular Weir** (Weir Controls 0.90 cfs @ 0.64 fps)

Summary for Pond 2AP: Basin 2A

Inflow Area = 6.411 ac, 0.00% Impervious, Inflow Depth = 2.86" for 10-Years event
Inflow = 12.20 cfs @ 12.41 hrs, Volume= 1.529 af
Outflow = 6.44 cfs @ 12.81 hrs, Volume= 1.529 af, Atten= 47%, Lag= 23.7 min
Primary = 6.44 cfs @ 12.81 hrs, Volume= 1.529 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 65.90' @ 12.81 hrs Surf.Area= 15,569 sf Storage= 19,667 cf

Plug-Flow detention time= 102.0 min calculated for 1.528 af (100% of inflow)
Center-of-Mass det. time= 102.0 min (947.8 - 845.8)

Volume	Invert	Avail.Storage	Storage Description
#1	64.00'	29,755 cf	**TP#2-1 (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
64.00	1	0	0
65.00	13,295	6,648	6,648
66.00	15,816	14,556	21,204
66.50	18,388	8,551	29,755

Device	Routing	Invert	Outlet Devices
#1	Primary	62.50'	**12.0" Round Culvert**
			L= 25.0' CMP, square edge headwall, Ke= 0.500
			Inlet / Outlet Invert= 62.50' / 61.90' S= 0.0240 '/' Cc= 0.900
			n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Device 1	65.40'	**48.0" Horiz. Orifice/Grate** C= 0.600
			Limited to weir flow at low heads
#3	Device 1	64.00'	**6.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Secondary	66.00'	**15.0' long x 0.50' rise Sharp-Crested Rectangular Weir**
			2 End Contraction(s) 0.9' Crest Height

Primary OutFlow Max=6.44 cfs @ 12.81 hrs HW=65.90' (Free Discharge)
└**1=Culvert** (Inlet Controls 6.44 cfs @ 8.20 fps)
  ├**2=Orifice/Grate** (Passes < 14.59 cfs potential flow)
  └**3=Orifice/Grate** (Passes < 1.21 cfs potential flow)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=64.00' (Free Discharge)
└**4=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond 2BP: Basin 2A

Inflow Area = 9.022 ac, 0.00% Impervious, Inflow Depth = 2.68" for 10-Years event
Inflow = 19.88 cfs @ 12.25 hrs, Volume= 2.016 af
Outflow = 18.89 cfs @ 12.31 hrs, Volume= 2.015 af, Atten= 5%, Lag= 3.7 min
Primary = 4.86 cfs @ 12.31 hrs, Volume= 1.464 af
Secondary = 14.03 cfs @ 12.31 hrs, Volume= 0.551 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 66.15' @ 12.31 hrs Surf.Area= 11,281 sf Storage= 16,293 cf

Plug-Flow detention time= 165.2 min calculated for 2.013 af (100% of inflow)
Center-of-Mass det. time= 166.4 min (1,006.6 - 840.2)

Volume	Invert	Avail.Storage	Storage Description
#1	64.00'	20,325 cf	**TP#3-1 (Prismatic)**Listed below

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
64.00	100	0	0
64.80	7,380	2,992	2,992
65.00	9,022	1,640	4,632
66.00	10,741	9,882	14,514
66.50	12,506	5,812	20,325

Device	Routing	Invert	Outlet Devices
#1	Primary	64.00'	**12.0" Round Culvert** L= 22.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 64.00' / 63.80' S= 0.0091 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Device 1	65.30'	**48.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Device 1	64.00'	**2.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Secondary	65.80'	**20.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s) 1.8' Crest Height

Primary OutFlow Max=4.86 cfs @ 12.31 hrs HW=66.15' (Free Discharge)
└**1=Culvert** (Inlet Controls 4.86 cfs @ 6.19 fps)
  ├**2=Orifice/Grate** (Passes < 6.13 cfs potential flow)
  └**3=Orifice/Grate** (Passes < 0.15 cfs potential flow)

Secondary OutFlow Max=13.84 cfs @ 12.31 hrs HW=66.15' (Free Discharge)
└**4=Sharp-Crested Rectangular Weir** (Weir Controls 13.84 cfs @ 1.98 fps)

Summary for Pond 2CP: Basin 2A

Inflow Area = 3.545 ac, 0.00% Impervious, Inflow Depth = 1.85" for 10-Years event
Inflow = 5.29 cfs @ 12.25 hrs, Volume= 0.547 af
Outflow = 4.28 cfs @ 12.42 hrs, Volume= 0.547 af, Atten= 19%, Lag= 10.0 min
Primary = 3.22 cfs @ 12.42 hrs, Volume= 0.534 af
Secondary = 1.06 cfs @ 12.42 hrs, Volume= 0.013 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 66.85' @ 12.42 hrs Surf.Area= 3,940 sf Storage= 5,304 cf

Plug-Flow detention time= 67.9 min calculated for 0.547 af (100% of inflow)
Center-of-Mass det. time= 67.5 min (932.6 - 865.1)

Volume	Invert	Avail.Storage	Storage Description
#1	65.00'	8,141 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
65.00	150	0	0
65.50	2,818	742	742
66.00	3,209	1,507	2,249
67.00	4,064	3,637	5,885
67.50	4,960	2,256	8,141

Device	Routing	Invert	Outlet Devices
#1	Primary	65.00'	**12.0" Round Culvert** L= 25.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 65.00' / 64.90' S= 0.0040 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Device 1	66.30'	**48.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Device 1	65.00'	**4.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Secondary	66.80'	**25.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s) 1.9' Crest Height

Primary OutFlow Max=3.17 cfs @ 12.42 hrs HW=66.85' (Free Discharge)
└**1=Culvert** (Passes 3.17 cfs of 4.06 cfs potential flow)
  ├**2=Orifice/Grate** (Orifice Controls 2.62 cfs @ 2.52 fps)
  └**3=Orifice/Grate** (Orifice Controls 0.55 cfs @ 6.25 fps)

Secondary OutFlow Max=0.90 cfs @ 12.42 hrs HW=66.85' (Free Discharge)
└**4=Sharp-Crested Rectangular Weir** (Weir Controls 0.90 cfs @ 0.73 fps)

Summary for Pond 3P: Basin 3A

Inflow Area = 7.751 ac, 0.00% Impervious, Inflow Depth = 1.14" for 10-Years event
Inflow = 5.31 cfs @ 12.43 hrs, Volume= 0.738 af
Outflow = 1.54 cfs @ 13.23 hrs, Volume= 0.738 af, Atten= 71%, Lag= 47.9 min
Primary = 1.54 cfs @ 13.23 hrs, Volume= 0.738 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 66.55' @ 13.23 hrs Surf.Area= 16,233 sf Storage= 11,588 cf

Plug-Flow detention time= 238.0 min calculated for 0.737 af (100% of inflow)
Center-of-Mass det. time= 239.3 min (1,142.1 - 902.9)

Volume	Invert	Avail.Storage	Storage Description
#1	65.50'	28,965 cf	**Custom Stage Data (Prismatic)** Listed below

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
65.50	100	0	0
66.10	14,230	4,299	4,299
67.00	18,245	14,614	18,913
67.50	21,965	10,053	28,965

Device	Routing	Invert	Outlet Devices
#1	Primary	65.30'	**10.0" Round Culvert** L= 22.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 65.30' / 65.10' S= 0.0091 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.55 sf
#2	Device 1	66.50'	**48.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Device 1	65.50'	**6.0" W x 2.0" H Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Secondary	66.90'	**5.0' long x 0.30' rise Sharp-Crested Rectangular Weir** 2 End Contraction(s) 2.4' Crest Height
#5	Primary	65.30'	**10.0" Round Culvert** L= 22.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 65.30' / 65.10' S= 0.0091 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.55 sf
#6	Device 5	66.50'	**48.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#7	Device 5	66.10'	**6.0" W x 2.0" H Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#8	Secondary	66.90'	**5.0' long x 0.30' rise Sharp-Crested Rectangular Weir** 2 End Contraction(s) 2.4' Crest Height

Primary OutFlow Max=1.52 cfs @ 13.23 hrs HW=66.55' (Free Discharge)
- **1=Culvert** (Passes 0.84 cfs of 2.23 cfs potential flow)
  - **2=Orifice/Grate** (Weir Controls 0.44 cfs @ 0.72 fps)
  - **3=Orifice/Grate** (Orifice Controls 0.39 cfs @ 4.73 fps)
- **5=Culvert** (Passes 0.69 cfs of 2.23 cfs potential flow)
  - **6=Orifice/Grate** (Weir Controls 0.44 cfs @ 0.72 fps)
  - **7=Orifice/Grate** (Orifice Controls 0.24 cfs @ 2.90 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=65.50' (Free Discharge)
- **4=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)
- **8=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Link DP-1: Wetland A

Inflow Area = 9.796 ac, 0.00% Impervious, Inflow Depth > 2.54" for 10-Years event
Inflow = 10.43 cfs @ 12.63 hrs, Volume= 2.076 af
Primary = 10.43 cfs @ 12.63 hrs, Volume= 2.076 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Summary for Link DP-2: Wetland B/C

Inflow Area = 18.978 ac, 0.00% Impervious, Inflow Depth = 2.59" for 10-Years event
Inflow = 25.65 cfs @ 12.44 hrs, Volume= 4.091 af
Primary = 25.65 cfs @ 12.44 hrs, Volume= 4.091 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Summary for Link DP-3: Wetland D

Inflow Area = 7.751 ac, 0.00% Impervious, Inflow Depth = 1.14" for 10-Years event
Inflow = 1.54 cfs @ 13.23 hrs, Volume= 0.738 af
Primary = 1.54 cfs @ 13.23 hrs, Volume= 0.738 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

25-Year Storm Event – Proposed

Summary for Subcatchment PR-1A: Subcat PR-1A

Runoff = 14.73 cfs @ 12.46 hrs, Volume= 1.956 af, Depth= 3.78"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Years Rainfall=6.11"

Area (ac)	CN	Description
2.056	71	Meadow, non-grazed, HSG C
0.825	78	Meadow, non-grazed, HSG D
1.525	98	Water Surface, 0% imp, HSG D
0.712	70	Woods, Good, HSG C
1.096	77	Woods, Good, HSG D
6.214	79	Weighted Average
6.214		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.9	50	0.0047	0.05		**Sheet Flow, meadow** n= 0.320 P2= 3.40"
13.1	291	0.0100	0.37		**Shallow Concentrated Flow, meadow** Kv= 3.7 fps
2.6	63	0.0064	0.40		**Shallow Concentrated Flow, woods** Woodland Kv= 5.0 fps
33.6	404	Total			

Summary for Subcatchment PR-1B: Subcat PR-1B

Runoff = 8.16 cfs @ 12.33 hrs, Volume= 0.920 af, Depth= 3.08"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Years Rainfall=6.11"

Area (ac)	CN	Description
2.836	71	Meadow, non-grazed, HSG C
0.033	78	Meadow, non-grazed, HSG D
0.074	89	Gravel roads, HSG C
0.039	91	Gravel roads, HSG D
0.271	70	Woods, Good, HSG C
0.329	77	Woods, Good, HSG D
3.582	72	Weighted Average
3.582		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.2	50	0.0100	0.06		**Sheet Flow, meadow** n= 0.320 P2= 3.40"
9.9	332	0.0226	0.56		**Shallow Concentrated Flow, meadow** Kv= 3.7 fps
23.1	382	Total			

Summary for Subcatchment PR-2A: Subcat PR-2A

Runoff = 16.08 cfs @ 12.41 hrs, Volume= 2.018 af, Depth= 3.78"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Years Rainfall=6.11"

Area (ac)	CN	Description
0.462	71	Meadow, non-grazed, HSG C
2.895	78	Meadow, non-grazed, HSG D
0.027	89	Gravel roads, HSG C
0.456	91	Gravel roads, HSG D
0.424	98	Water Surface, 0% imp, HSG D
0.040	70	Woods, Good, HSG C
2.107	77	Woods, Good, HSG D
6.411	79	Weighted Average
6.411		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.2	50	0.0060	0.05		**Sheet Flow, meadow** n= 0.320 P2= 3.40"
10.5	324	0.0192	0.51		**Shallow Concentrated Flow, meadow** Kv= 3.7 fps
0.2	20	0.0100	1.61		**Shallow Concentrated Flow, gravel** Unpaved Kv= 16.1 fps
2.8	138	0.0029	0.81		**Shallow Concentrated Flow, basin** Grassed Waterway Kv= 15.0 fps
29.7	532	Total			

Summary for Subcatchment PR-2B: Subcat PR-2B

Runoff = 26.53 cfs @ 12.25 hrs, Volume= 2.688 af, Depth= 3.58"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Years Rainfall=6.11"

	Area (ac)	CN	Description
	2.512	78	Meadow, non-grazed, HSG D
	2.085	71	Meadow, non-grazed, HSG C
	0.334	91	Gravel roads, HSG D
*	0.289	98	Water Surface, 0% imp
	2.813	77	Woods, Good, HSG D
	0.253	89	Gravel roads, HSG C
	0.736	70	Woods, Good, HSG C
	9.022	77	Weighted Average
	9.022		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.5	50	0.0300	0.10		**Sheet Flow, meadow** n= 0.320 P2= 3.40"
7.7	227	0.0176	0.49		**Shallow Concentrated Flow, meadow** Kv= 3.7 fps
0.4	66	0.0379	3.13		**Shallow Concentrated Flow, gravel** Unpaved Kv= 16.1 fps
1.4	65	0.0460	0.79		**Shallow Concentrated Flow, meadow** Kv= 3.7 fps
18.0	408	Total			

Summary for Subcatchment PR-2C: Subcat PR-2C

Runoff = 7.62 cfs @ 12.25 hrs, Volume= 0.772 af, Depth= 2.61"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Years Rainfall=6.11"

	Area (ac)	CN	Description
	0.049	30	Meadow, non-grazed, HSG A
	1.213	71	Meadow, non-grazed, HSG C
	0.026	78	Meadow, non-grazed, HSG D
	0.071	76	Gravel roads, HSG A
	0.050	91	Gravel roads, HSG D
*	0.115	98	Water Surface, 0% imp
	0.477	30	Woods, Good, HSG A
	1.320	70	Woods, Good, HSG C
	0.033	77	Woods, Good, HSG D
	0.191	89	Gravel roads, HSG C
	3.545	67	Weighted Average
	3.545		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.4	50	0.0600	0.13		**Sheet Flow, meadow** n= 0.320 P2= 3.40"
9.8	380	0.0302	0.64		**Shallow Concentrated Flow, meadow** Kv= 3.7 fps
1.0	50	0.0300	0.87		**Shallow Concentrated Flow, meadow** Woodland Kv= 5.0 fps
17.2	480	Total			

Summary for Subcatchment PR-3: Subcat PR-3

Runoff = 8.71 cfs @ 12.41 hrs, Volume= 1.126 af, Depth= 1.74"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Years Rainfall=6.11"

Area (ac)	CN	Description
2.017	30	Meadow, non-grazed, HSG A
2.272	71	Meadow, non-grazed, HSG C
0.061	78	Meadow, non-grazed, HSG D
0.131	76	Gravel roads, HSG A
0.251	89	Gravel roads, HSG C
0.505	98	Water Surface, 0% imp, HSG C
1.085	30	Woods, Good, HSG A
0.885	70	Woods, Good, HSG C
0.544	77	Woods, Good, HSG D
7.751	57	Weighted Average
7.751		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.9	50	0.0167	0.06		**Sheet Flow, woods** Woods: Light underbrush n= 0.400 P2= 3.40"
0.8	35	0.0220	0.74		**Shallow Concentrated Flow, woods** Woodland Kv= 5.0 fps
10.8	496	0.0425	0.76		**Shallow Concentrated Flow, meadow** Kv= 3.7 fps
0.1	21	0.0225	2.42		**Shallow Concentrated Flow, gravel** Unpaved Kv= 16.1 fps
1.6	25	0.0050	0.26		**Shallow Concentrated Flow, meadow** Kv= 3.7 fps
26.2	627	Total			

Summary for Pond 1AP: Basin 1A

Inflow Area = 6.214 ac, 0.00% Impervious, Inflow Depth = 3.78" for 25-Years event
Inflow = 14.73 cfs @ 12.46 hrs, Volume= 1.956 af
Outflow = 8.10 cfs @ 12.87 hrs, Volume= 1.878 af, Atten= 45%, Lag= 24.2 min
Primary = 6.97 cfs @ 12.87 hrs, Volume= 1.844 af
Secondary = 1.13 cfs @ 12.87 hrs, Volume= 0.034 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 70.00' @ 12.87 hrs Surf.Area= 41,093 sf Storage= 28,558 cf

Plug-Flow detention time= 280.2 min calculated for 1.878 af (96% of inflow)
Center-of-Mass det. time= 257.6 min (1,099.1 - 841.5)

Volume	Invert	Avail.Storage	Storage Description
#1	68.90'	49,093 cf	**Custom Stage Data (Prismatic)** Listed below

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
68.90	500	0	0
69.00	14,500	750	750
70.00	41,093	27,797	28,546
70.50	41,093	20,547	49,093

Device	Routing	Invert	Outlet Devices
#1	Primary	66.10'	**12.0" Round Culvert** L= 25.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 66.10' / 65.90' S= 0.0080 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Device 1	69.40'	**48.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Device 1	68.90'	**2.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Secondary	69.90'	**15.0' long x 6.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.37 2.51 2.70 2.68 2.68 2.67 2.65 2.65 2.65 2.65 2.66 2.66 2.67 2.69 2.72 2.76 2.83

Primary OutFlow Max=6.97 cfs @ 12.87 hrs HW=70.00' (Free Discharge)
└**1=Culvert** (Inlet Controls 6.97 cfs @ 8.88 fps)
  ├**2=Orifice/Grate** (Passes < 19.08 cfs potential flow)
  └**3=Orifice/Grate** (Passes < 0.11 cfs potential flow)

Secondary OutFlow Max=1.12 cfs @ 12.87 hrs HW=70.00' (Free Discharge)
└**4=Broad-Crested Rectangular Weir** (Weir Controls 1.12 cfs @ 0.75 fps)

Summary for Pond 1BP: Basin 1B

Inflow Area = 3.582 ac, 0.00% Impervious, Inflow Depth = 3.08" for 25-Years event
Inflow = 8.16 cfs @ 12.33 hrs, Volume= 0.920 af
Outflow = 7.22 cfs @ 12.46 hrs, Volume= 0.920 af, Atten= 12%, Lag= 8.2 min
Primary = 3.03 cfs @ 12.46 hrs, Volume= 0.813 af
Secondary = 4.19 cfs @ 12.46 hrs, Volume= 0.107 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 66.09' @ 12.46 hrs Surf.Area= 5,704 sf Storage= 7,330 cf

Plug-Flow detention time= 50.2 min calculated for 0.920 af (100% of inflow)
Center-of-Mass det. time= 51.4 min (899.9 - 848.5)

Volume	Invert	Avail.Storage	Storage Description
#1	64.30'	8,923 cf	**Custom Stage Data (Prismatic)** Listed below

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
64.30	250	0	0
65.00	4,363	1,615	1,615
66.40	6,077	7,308	8,923

Device	Routing	Invert	Outlet Devices
#1	Primary	64.30'	**10.0" Round Culvert** L= 23.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 64.30' / 64.10' S= 0.0087 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.55 sf
#2	Device 1	64.90'	**48.0" Horiz. Orifice/Grate** C= 0.600

			Limited to weir flow at low heads
#3	Device 1	64.30'	**2.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Secondary	65.90'	**20.0' long x 8.0' breadth Broad-Crested Rectangular Weir**
			Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50
			Coef. (English) 2.43 2.54 2.70 2.69 2.68 2.68 2.66 2.64 2.64 2.64 2.65 2.65 2.66 2.66 2.68 2.70 2.74

Primary OutFlow Max=3.03 cfs @ 12.46 hrs HW=66.09' (Free Discharge)
└**1=Culvert** (Barrel Controls 3.03 cfs @ 5.55 fps)
  └**2=Orifice/Grate** (Passes < 53.49 cfs potential flow)
  └**3=Orifice/Grate** (Passes < 0.14 cfs potential flow)

Secondary OutFlow Max=4.10 cfs @ 12.46 hrs HW=66.09' (Free Discharge)
└**4=Broad-Crested Rectangular Weir** (Weir Controls 4.10 cfs @ 1.07 fps)

Summary for Pond 2AP: Basin 2A

Inflow Area = 6.411 ac, 0.00% Impervious, Inflow Depth = 3.78" for 25-Years event
Inflow = 16.08 cfs @ 12.41 hrs, Volume= 2.018 af
Outflow = 10.96 cfs @ 12.69 hrs, Volume= 2.018 af, Atten= 32%, Lag= 17.0 min
Primary = 6.76 cfs @ 12.69 hrs, Volume= 1.895 af
Secondary = 4.20 cfs @ 12.69 hrs, Volume= 0.124 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 66.19' @ 12.69 hrs Surf.Area= 16,800 sf Storage= 24,322 cf

Plug-Flow detention time= 93.0 min calculated for 2.018 af (100% of inflow)
Center-of-Mass det. time= 92.7 min (930.6 - 837.9)

Volume	Invert	Avail.Storage	Storage Description
#1	64.00'	29,755 cf	**TP#2-1 (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
64.00	1	0	0
65.00	13,295	6,648	6,648
66.00	15,816	14,556	21,204
66.50	18,388	8,551	29,755

Device	Routing	Invert	Outlet Devices
#1	Primary	62.50'	**12.0" Round Culvert**
			L= 25.0' CMP, square edge headwall, Ke= 0.500
			Inlet / Outlet Invert= 62.50' / 61.90' S= 0.0240 '/' Cc= 0.900
			n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Device 1	65.40'	**48.0" Horiz. Orifice/Grate** C= 0.600
			Limited to weir flow at low heads
#3	Device 1	64.00'	**6.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Secondary	66.00'	**15.0' long x 0.50' rise Sharp-Crested Rectangular Weir**
			2 End Contraction(s) 0.9' Crest Height

Primary OutFlow Max=6.75 cfs @ 12.69 hrs HW=66.19' (Free Discharge)
└**1=Culvert** (Inlet Controls 6.75 cfs @ 8.60 fps)
  ├**2=Orifice/Grate** (Passes < 28.88 cfs potential flow)
  └**3=Orifice/Grate** (Passes < 1.32 cfs potential flow)

Secondary OutFlow Max=4.17 cfs @ 12.69 hrs HW=66.19' (Free Discharge)
└**4=Sharp-Crested Rectangular Weir** (Weir Controls 4.17 cfs @ 1.46 fps)

Summary for Pond 2BP: Basin 2A

Inflow Area = 9.022 ac, 0.00% Impervious, Inflow Depth = 3.58" for 25-Years event
Inflow = 26.53 cfs @ 12.25 hrs, Volume= 2.688 af
Outflow = 25.56 cfs @ 12.30 hrs, Volume= 2.687 af, Atten= 4%, Lag= 3.1 min
Primary = 5.01 cfs @ 12.30 hrs, Volume= 1.752 af
Secondary = 20.55 cfs @ 12.30 hrs, Volume= 0.935 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 66.25' @ 12.30 hrs Surf.Area= 11,637 sf Storage= 17,465 cf

Plug-Flow detention time= 130.0 min calculated for 2.685 af (100% of inflow)
Center-of-Mass det. time= 131.3 min (963.3 - 831.9)

Volume	Invert	Avail.Storage	Storage Description
#1	64.00'	20,325 cf	**TP#3-1 (Prismatic)** Listed below

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
64.00	100	0	0
64.80	7,380	2,992	2,992
65.00	9,022	1,640	4,632
66.00	10,741	9,882	14,514
66.50	12,506	5,812	20,325

Device	Routing	Invert	Outlet Devices
#1	Primary	64.00'	**12.0" Round Culvert** L= 22.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 64.00' / 63.80' S= 0.0091 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Device 1	65.30'	**48.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Device 1	64.00'	**2.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Secondary	65.80'	**20.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s) 1.8' Crest Height

Primary OutFlow Max=5.01 cfs @ 12.30 hrs HW=66.25' (Free Discharge)
└**1=Culvert** (Inlet Controls 5.01 cfs @ 6.38 fps)
  ├**2=Orifice/Grate** (Passes < 7.64 cfs potential flow)
  └**3=Orifice/Grate** (Passes < 0.15 cfs potential flow)

Secondary OutFlow Max=20.50 cfs @ 12.30 hrs HW=66.25' (Free Discharge)
└**4=Sharp-Crested Rectangular Weir** (Weir Controls 20.50 cfs @ 2.27 fps)

Summary for Pond 2CP: Basin 2A

Inflow Area = 3.545 ac, 0.00% Impervious, Inflow Depth = 2.61" for 25-Years event
Inflow = 7.62 cfs @ 12.25 hrs, Volume= 0.772 af
Outflow = 7.54 cfs @ 12.30 hrs, Volume= 0.772 af, Atten= 1%, Lag= 3.3 min
Primary = 3.91 cfs @ 12.30 hrs, Volume= 0.694 af
Secondary = 3.63 cfs @ 12.30 hrs, Volume= 0.078 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 66.92' @ 12.30 hrs Surf.Area= 3,999 sf Storage= 5,577 cf

Plug-Flow detention time= 59.0 min calculated for 0.772 af (100% of inflow)
Center-of-Mass det. time= 58.8 min (913.5 - 854.8)

Volume	Invert	Avail.Storage	Storage Description
#1	65.00'	8,141 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
65.00	150	0	0
65.50	2,818	742	742
66.00	3,209	1,507	2,249
67.00	4,064	3,637	5,885
67.50	4,960	2,256	8,141

Device	Routing	Invert	Outlet Devices
#1	Primary	65.00'	**12.0" Round Culvert** L= 25.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 65.00' / 64.90' S= 0.0040 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Device 1	66.30'	**48.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Device 1	65.00'	**4.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Secondary	66.80'	**25.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s) 1.9' Crest Height

Primary OutFlow Max=3.91 cfs @ 12.30 hrs HW=66.92' (Free Discharge)
└**1=Culvert** (Passes 3.91 cfs of 4.22 cfs potential flow)
  ├**2=Orifice/Grate** (Orifice Controls 3.35 cfs @ 2.69 fps)
  └**3=Orifice/Grate** (Orifice Controls 0.56 cfs @ 6.38 fps)

Secondary OutFlow Max=3.54 cfs @ 12.30 hrs HW=66.92' (Free Discharge)
└**4=Sharp-Crested Rectangular Weir** (Weir Controls 3.54 cfs @ 1.15 fps)

Summary for Pond 3P: Basin 3A

Inflow Area = 7.751 ac, 0.00% Impervious, Inflow Depth = 1.74" for 25-Years event
Inflow = 8.71 cfs @ 12.41 hrs, Volume= 1.126 af
Outflow = 4.89 cfs @ 12.78 hrs, Volume= 1.126 af, Atten= 44%, Lag= 22.2 min
Primary = 4.89 cfs @ 12.78 hrs, Volume= 1.126 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 66.68' @ 12.78 hrs Surf.Area= 16,804 sf Storage= 13,667 cf

Plug-Flow detention time= 182.1 min calculated for 1.126 af (100% of inflow)
Center-of-Mass det. time= 181.9 min (1,070.5 - 888.6)

Volume	Invert	Avail.Storage	Storage Description
#1	65.50'	28,965 cf	**Custom Stage Data (Prismatic)** Listed below

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
65.50	100	0	0
66.10	14,230	4,299	4,299
67.00	18,245	14,614	18,913
67.50	21,965	10,053	28,965

Device	Routing	Invert	Outlet Devices
#1	Primary	65.30'	**10.0" Round Culvert** L= 22.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 65.30' / 65.10' S= 0.0091 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.55 sf
#2	Device 1	66.50'	**48.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Device 1	65.50'	**6.0" W x 2.0" H Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Secondary	66.90'	**5.0' long x 0.30' rise Sharp-Crested Rectangular Weir** 2 End Contraction(s) 2.4' Crest Height
#5	Primary	65.30'	**10.0" Round Culvert** L= 22.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 65.30' / 65.10' S= 0.0091 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.55 sf
#6	Device 5	66.50'	**48.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#7	Device 5	66.10'	**6.0" W x 2.0" H Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#8	Secondary	66.90'	**5.0' long x 0.30' rise Sharp-Crested Rectangular Weir** 2 End Contraction(s) 2.4' Crest Height

Primary OutFlow Max=4.89 cfs @ 12.78 hrs HW=66.68' (Free Discharge)
- **1=Culvert** (Barrel Controls 2.44 cfs @ 4.48 fps)
  - **2=Orifice/Grate** (Passes < 3.04 cfs potential flow)
  - **3=Orifice/Grate** (Passes < 0.42 cfs potential flow)
- **5=Culvert** (Barrel Controls 2.44 cfs @ 4.48 fps)
  - **6=Orifice/Grate** (Passes < 3.04 cfs potential flow)
  - **7=Orifice/Grate** (Passes < 0.28 cfs potential flow)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=65.50' (Free Discharge)
- **4=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)
- **8=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Link DP-1: Wetland A

Inflow Area = 9.796 ac, 0.00% Impervious, Inflow Depth > 3.43" for 25-Years event
Inflow = 13.95 cfs @ 12.47 hrs, Volume= 2.798 af
Primary = 13.95 cfs @ 12.47 hrs, Volume= 2.798 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Summary for Link DP-2: Wetland B/C

Inflow Area = 18.978 ac, 0.00% Impervious, Inflow Depth = 3.46" for 25-Years event
Inflow = 38.48 cfs @ 12.32 hrs, Volume= 5.477 af
Primary = 38.48 cfs @ 12.32 hrs, Volume= 5.477 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Summary for Link DP-3: Wetland D

Inflow Area = 7.751 ac, 0.00% Impervious, Inflow Depth = 1.74" for 25-Years event
Inflow = 4.89 cfs @ 12.78 hrs, Volume= 1.126 af
Primary = 4.89 cfs @ 12.78 hrs, Volume= 1.126 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

100-Year Storm Event – Proposed

Summary for Subcatchment PR-1A: Subcat PR-1A

Runoff = 20.30 cfs @ 12.46 hrs, Volume= 2.713 af, Depth= 5.24"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Years Rainfall=7.71"

Area (ac)	CN	Description
2.056	71	Meadow, non-grazed, HSG C
0.825	78	Meadow, non-grazed, HSG D
1.525	98	Water Surface, 0% imp, HSG D
0.712	70	Woods, Good, HSG C
1.096	77	Woods, Good, HSG D
6.214	79	Weighted Average
6.214		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.9	50	0.0047	0.05		**Sheet Flow, meadow** n= 0.320 P2= 3.40"
13.1	291	0.0100	0.37		**Shallow Concentrated Flow, meadow** Kv= 3.7 fps
2.6	63	0.0064	0.40		**Shallow Concentrated Flow, woods** Woodland Kv= 5.0 fps
33.6	404	Total			

Summary for Subcatchment PR-1B: Subcat PR-1B

Runoff = 11.82 cfs @ 12.32 hrs, Volume= 1.326 af, Depth= 4.44"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Years Rainfall=7.71"

Area (ac)	CN	Description
2.836	71	Meadow, non-grazed, HSG C
0.033	78	Meadow, non-grazed, HSG D
0.074	89	Gravel roads, HSG C
0.039	91	Gravel roads, HSG D
0.271	70	Woods, Good, HSG C
0.329	77	Woods, Good, HSG D
3.582	72	Weighted Average
3.582		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.2	50	0.0100	0.06		**Sheet Flow, meadow** n= 0.320 P2= 3.40"
9.9	332	0.0226	0.56		**Shallow Concentrated Flow, meadow** Kv= 3.7 fps
23.1	382	Total			

Summary for Subcatchment PR-2A: Subcat PR-2A

Runoff = 22.15 cfs @ 12.40 hrs, Volume= 2.799 af, Depth= 5.24"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Years Rainfall=7.71"

Area (ac)	CN	Description
0.462	71	Meadow, non-grazed, HSG C
2.895	78	Meadow, non-grazed, HSG D
0.027	89	Gravel roads, HSG C
0.456	91	Gravel roads, HSG D
0.424	98	Water Surface, 0% imp, HSG D
0.040	70	Woods, Good, HSG C
2.107	77	Woods, Good, HSG D
6.411	79	Weighted Average
6.411		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.2	50	0.0060	0.05		**Sheet Flow, meadow** n= 0.320 P2= 3.40"
10.5	324	0.0192	0.51		**Shallow Concentrated Flow, meadow** Kv= 3.7 fps
0.2	20	0.0100	1.61		**Shallow Concentrated Flow, gravel** Unpaved Kv= 16.1 fps
2.8	138	0.0029	0.81		**Shallow Concentrated Flow, basin** Grassed Waterway Kv= 15.0 fps
29.7	532	Total			

Summary for Subcatchment PR-2B: Subcat PR-2B

Runoff = 37.01 cfs @ 12.25 hrs, Volume= 3.766 af, Depth= 5.01"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Years Rainfall=7.71"

	Area (ac)	CN	Description
	2.512	78	Meadow, non-grazed, HSG D
	2.085	71	Meadow, non-grazed, HSG C
	0.334	91	Gravel roads, HSG D
*	0.289	98	Water Surface, 0% imp
	2.813	77	Woods, Good, HSG D
	0.253	89	Gravel roads, HSG C
	0.736	70	Woods, Good, HSG C
	9.022	77	Weighted Average
	9.022		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.5	50	0.0300	0.10		**Sheet Flow, meadow** n= 0.320 P2= 3.40"
7.7	227	0.0176	0.49		**Shallow Concentrated Flow, meadow** Kv= 3.7 fps
0.4	66	0.0379	3.13		**Shallow Concentrated Flow, gravel** Unpaved Kv= 16.1 fps
1.4	65	0.0460	0.79		**Shallow Concentrated Flow, meadow** Kv= 3.7 fps
18.0	408	Total			

Summary for Subcatchment PR-2C: Subcat PR-2C

Runoff = 11.47 cfs @ 12.24 hrs, Volume= 1.147 af, Depth= 3.88"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Years Rainfall=7.71"

	Area (ac)	CN	Description
	0.049	30	Meadow, non-grazed, HSG A
	1.213	71	Meadow, non-grazed, HSG C
	0.026	78	Meadow, non-grazed, HSG D
	0.071	76	Gravel roads, HSG A
	0.050	91	Gravel roads, HSG D
*	0.115	98	Water Surface, 0% imp
	0.477	30	Woods, Good, HSG A
	1.320	70	Woods, Good, HSG C
	0.033	77	Woods, Good, HSG D
	0.191	89	Gravel roads, HSG C
	3.545	67	Weighted Average
	3.545		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.4	50	0.0600	0.13		**Sheet Flow, meadow** n= 0.320 P2= 3.40"
9.8	380	0.0302	0.64		**Shallow Concentrated Flow, meadow** Kv= 3.7 fps
1.0	50	0.0300	0.87		**Shallow Concentrated Flow, meadow** Woodland Kv= 5.0 fps
17.2	480	Total			

Summary for Subcatchment PR-3: Subcat PR-3

Runoff = 14.67 cfs @ 12.39 hrs, Volume= 1.807 af, Depth= 2.80"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Years Rainfall=7.71"

Area (ac)	CN	Description
2.017	30	Meadow, non-grazed, HSG A
2.272	71	Meadow, non-grazed, HSG C
0.061	78	Meadow, non-grazed, HSG D
0.131	76	Gravel roads, HSG A
0.251	89	Gravel roads, HSG C
0.505	98	Water Surface, 0% imp, HSG C
1.085	30	Woods, Good, HSG A
0.885	70	Woods, Good, HSG C
0.544	77	Woods, Good, HSG D
7.751	57	Weighted Average
7.751		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.9	50	0.0167	0.06		**Sheet Flow, woods** Woods: Light underbrush n= 0.400 P2= 3.40"
0.8	35	0.0220	0.74		**Shallow Concentrated Flow, woods** Woodland Kv= 5.0 fps
10.8	496	0.0425	0.76		**Shallow Concentrated Flow, meadow** Kv= 3.7 fps
0.1	21	0.0225	2.42		**Shallow Concentrated Flow, gravel** Unpaved Kv= 16.1 fps
1.6	25	0.0050	0.26		**Shallow Concentrated Flow, meadow** Kv= 3.7 fps
26.2	627	Total			

Summary for Pond 1AP: Basin 1A

Inflow Area = 6.214 ac, 0.00% Impervious, Inflow Depth = 5.24" for 100-Years event
Inflow = 20.30 cfs @ 12.46 hrs, Volume= 2.713 af
Outflow = 12.86 cfs @ 12.79 hrs, Volume= 2.634 af, Atten= 37%, Lag= 20.0 min
Primary = 7.17 cfs @ 12.79 hrs, Volume= 2.321 af
Secondary = 5.70 cfs @ 12.79 hrs, Volume= 0.313 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 70.19' @ 12.79 hrs Surf.Area= 41,093 sf Storage= 36,348 cf

Plug-Flow detention time= 214.4 min calculated for 2.634 af (97% of inflow)
Center-of-Mass det. time= 197.3 min (1,029.5 - 832.2)

Volume	Invert	Avail.Storage	Storage Description
#1	68.90'	49,093 cf	**Custom Stage Data (Prismatic)** Listed below

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
68.90	500	0	0
69.00	14,500	750	750
70.00	41,093	27,797	28,546
70.50	41,093	20,547	49,093

Device	Routing	Invert	Outlet Devices
#1	Primary	66.10'	**12.0" Round Culvert** L= 25.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 66.10' / 65.90' S= 0.0080 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Device 1	69.40'	**48.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Device 1	68.90'	**2.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Secondary	69.90'	**15.0' long x 6.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.37 2.51 2.70 2.68 2.68 2.67 2.65 2.65 2.65 2.65 2.66 2.66 2.67 2.69 2.72 2.76 2.83

Primary OutFlow Max=7.16 cfs @ 12.79 hrs HW=70.19' (Free Discharge)
└**1=Culvert** (Inlet Controls 7.16 cfs @ 9.12 fps)
  ├**2=Orifice/Grate** (Passes < 28.82 cfs potential flow)
  └**3=Orifice/Grate** (Passes < 0.12 cfs potential flow)

Secondary OutFlow Max=5.68 cfs @ 12.79 hrs HW=70.19' (Free Discharge)
└**4=Broad-Crested Rectangular Weir** (Weir Controls 5.68 cfs @ 1.31 fps)

Summary for Pond 1BP: Basin 1B

Inflow Area = 3.582 ac, 0.00% Impervious, Inflow Depth = 4.44" for 100-Years event
Inflow = 11.82 cfs @ 12.32 hrs, Volume= 1.326 af
Outflow = 11.63 cfs @ 12.37 hrs, Volume= 1.325 af, Atten= 2%, Lag= 3.1 min
Primary = 3.17 cfs @ 12.37 hrs, Volume= 1.041 af
Secondary = 8.46 cfs @ 12.37 hrs, Volume= 0.284 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 66.21' @ 12.37 hrs Surf.Area= 5,841 sf Storage= 7,914 cf

Plug-Flow detention time= 40.4 min calculated for 1.325 af (100% of inflow)
Center-of-Mass det. time= 40.1 min (878.1 - 838.0)

Volume	Invert	Avail.Storage	Storage Description
#1	64.30'	8,923 cf	**Custom Stage Data (Prismatic)** Listed below

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
64.30	250	0	0
65.00	4,363	1,615	1,615
66.40	6,077	7,308	8,923

Device	Routing	Invert	Outlet Devices
#1	Primary	64.30'	**10.0" Round Culvert** L= 23.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 64.30' / 64.10' S= 0.0087 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.55 sf
#2	Device 1	64.90'	**48.0" Horiz. Orifice/Grate** C= 0.600

Limited to weir flow at low heads
#3 Device 1 64.30' **2.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4 Secondary 65.90' **20.0' long x 8.0' breadth Broad-Crested Rectangular Weir**
Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50
Coef. (English) 2.43 2.54 2.70 2.69 2.68 2.68 2.66 2.64 2.64 2.64 2.65 2.65 2.66 2.66 2.68 2.70 2.74

Primary OutFlow Max=3.17 cfs @ 12.37 hrs HW=66.20' (Free Discharge)
└**1=Culvert** (Barrel Controls 3.17 cfs @ 5.81 fps)
└**2=Orifice/Grate** (Passes < 61.12 cfs potential flow)
└**3=Orifice/Grate** (Passes < 0.14 cfs potential flow)

Secondary OutFlow Max=8.29 cfs @ 12.37 hrs HW=66.20' (Free Discharge)
└**4=Broad-Crested Rectangular Weir** (Weir Controls 8.29 cfs @ 1.37 fps)

Summary for Pond 2AP: Basin 2A

Inflow Area = 6.411 ac, 0.00% Impervious, Inflow Depth = 5.24" for 100-Years event
Inflow = 22.15 cfs @ 12.40 hrs, Volume= 2.799 af
Outflow = 19.09 cfs @ 12.57 hrs, Volume= 2.799 af, Atten= 14%, Lag= 9.7 min
Primary = 6.95 cfs @ 12.57 hrs, Volume= 2.318 af
Secondary = 12.14 cfs @ 12.57 hrs, Volume= 0.480 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 66.38' @ 12.57 hrs Surf.Area= 17,783 sf Storage= 27,626 cf

Plug-Flow detention time= 81.2 min calculated for 2.797 af (100% of inflow)
Center-of-Mass det. time= 81.3 min (909.9 - 828.6)

Volume	Invert	Avail.Storage	Storage Description
#1	64.00'	29,755 cf	**TP#2-1 (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
64.00	1	0	0
65.00	13,295	6,648	6,648
66.00	15,816	14,556	21,204
66.50	18,388	8,551	29,755

Device	Routing	Invert	Outlet Devices
#1	Primary	62.50'	**12.0" Round Culvert** L= 25.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 62.50' / 61.90' S= 0.0240 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Device 1	65.40'	**48.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Device 1	64.00'	**6.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Secondary	66.00'	**15.0' long x 0.50' rise Sharp-Crested Rectangular Weir** 2 End Contraction(s) 0.9' Crest Height

Primary OutFlow Max=6.95 cfs @ 12.57 hrs HW=66.38' (Free Discharge)
└**1=Culvert** (Inlet Controls 6.95 cfs @ 8.85 fps)
  ├**2=Orifice/Grate** (Passes < 39.88 cfs potential flow)
  └**3=Orifice/Grate** (Passes < 1.38 cfs potential flow)

Secondary OutFlow Max=12.04 cfs @ 12.57 hrs HW=66.38' (Free Discharge)
└**4=Sharp-Crested Rectangular Weir** (Weir Controls 12.04 cfs @ 2.12 fps)

Summary for Pond 2BP: Basin 2A

Inflow Area = 9.022 ac, 0.00% Impervious, Inflow Depth = 5.01" for 100-Years event
Inflow = 37.01 cfs @ 12.25 hrs, Volume= 3.766 af
Outflow = 35.94 cfs @ 12.29 hrs, Volume= 3.764 af, Atten= 3%, Lag= 2.7 min
Primary = 5.20 cfs @ 12.29 hrs, Volume= 2.182 af
Secondary = 30.74 cfs @ 12.29 hrs, Volume= 1.583 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 66.39' @ 12.29 hrs Surf.Area= 12,121 sf Storage= 19,059 cf

Plug-Flow detention time= 98.9 min calculated for 3.762 af (100% of inflow)
Center-of-Mass det. time= 100.3 min (922.6 - 822.3)

Volume	Invert	Avail.Storage	Storage Description
#1	64.00'	20,325 cf	**TP#3-1 (Prismatic)** Listed below

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
64.00	100	0	0
64.80	7,380	2,992	2,992
65.00	9,022	1,640	4,632
66.00	10,741	9,882	14,514
66.50	12,506	5,812	20,325

Device	Routing	Invert	Outlet Devices
#1	Primary	64.00'	**12.0" Round Culvert** L= 22.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 64.00' / 63.80' S= 0.0091 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Device 1	65.30'	**48.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Device 1	64.00'	**2.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Secondary	65.80'	**20.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s) 1.8' Crest Height

Primary OutFlow Max=5.20 cfs @ 12.29 hrs HW=66.39' (Free Discharge)
└**1=Culvert** (Inlet Controls 5.20 cfs @ 6.62 fps)
  ├**2=Orifice/Grate** (Passes < 9.83 cfs potential flow)
  └**3=Orifice/Grate** (Passes < 0.16 cfs potential flow)

Secondary OutFlow Max=30.54 cfs @ 12.29 hrs HW=66.39' (Free Discharge)
└**4=Sharp-Crested Rectangular Weir** (Weir Controls 30.54 cfs @ 2.61 fps)

Summary for Pond 2CP: Basin 2A

Inflow Area = 3.545 ac, 0.00% Impervious, Inflow Depth = 3.88" for 100-Years event
Inflow = 11.47 cfs @ 12.24 hrs, Volume= 1.147 af
Outflow = 11.41 cfs @ 12.26 hrs, Volume= 1.147 af, Atten= 1%, Lag= 1.3 min
Primary = 4.36 cfs @ 12.26 hrs, Volume= 0.929 af
Secondary = 7.05 cfs @ 12.26 hrs, Volume= 0.218 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 66.99' @ 12.26 hrs Surf.Area= 4,058 sf Storage= 5,859 cf

Plug-Flow detention time= 50.3 min calculated for 1.147 af (100% of inflow)
Center-of-Mass det. time= 50.0 min (893.2 - 843.2)

Volume	Invert	Avail.Storage	Storage Description
#1	65.00'	8,141 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
65.00	150	0	0
65.50	2,818	742	742
66.00	3,209	1,507	2,249
67.00	4,064	3,637	5,885
67.50	4,960	2,256	8,141

Device	Routing	Invert	Outlet Devices
#1	Primary	65.00'	**12.0" Round Culvert** L= 25.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 65.00' / 64.90' S= 0.0040 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Device 1	66.30'	**48.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Device 1	65.00'	**4.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Secondary	66.80'	**25.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s) 1.9' Crest Height

Primary OutFlow Max=4.36 cfs @ 12.26 hrs HW=66.99' (Free Discharge)
└**1=Culvert** (Barrel Controls 4.36 cfs @ 5.55 fps)
  ├**2=Orifice/Grate** (Passes < 4.11 cfs potential flow)
  └**3=Orifice/Grate** (Passes < 0.57 cfs potential flow)

Secondary OutFlow Max=6.93 cfs @ 12.26 hrs HW=66.99' (Free Discharge)
└**4=Sharp-Crested Rectangular Weir** (Weir Controls 6.93 cfs @ 1.45 fps)

Summary for Pond 3P: Basin 3A

Inflow Area = 7.751 ac, 0.00% Impervious, Inflow Depth = 2.80" for 100-Years event
Inflow = 14.67 cfs @ 12.39 hrs, Volume= 1.807 af
Outflow = 8.91 cfs @ 12.72 hrs, Volume= 1.807 af, Atten= 39%, Lag= 19.8 min
Primary = 6.11 cfs @ 12.72 hrs, Volume= 1.710 af
Secondary = 2.80 cfs @ 12.72 hrs, Volume= 0.097 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 67.09' @ 12.72 hrs Surf.Area= 18,943 sf Storage= 20,800 cf

Plug-Flow detention time= 136.7 min calculated for 1.807 af (100% of inflow)
Center-of-Mass det. time= 136.5 min (1,010.3 - 873.8)

Volume	Invert	Avail.Storage	Storage Description
#1	65.50'	28,965 cf	**Custom Stage Data (Prismatic)** Listed below

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
65.50	100	0	0
66.10	14,230	4,299	4,299
67.00	18,245	14,614	18,913
67.50	21,965	10,053	28,965

Device	Routing	Invert	Outlet Devices
#1	Primary	65.30'	**10.0" Round Culvert** L= 22.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 65.30' / 65.10' S= 0.0091 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.55 sf
#2	Device 1	66.50'	**48.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Device 1	65.50'	**6.0" W x 2.0" H Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Secondary	66.90'	**5.0' long x 0.30' rise Sharp-Crested Rectangular Weir** 2 End Contraction(s) 2.4' Crest Height
#5	Primary	65.30'	**10.0" Round Culvert** L= 22.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 65.30' / 65.10' S= 0.0091 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.55 sf
#6	Device 5	66.50'	**48.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#7	Device 5	66.10'	**6.0" W x 2.0" H Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#8	Secondary	66.90'	**5.0' long x 0.30' rise Sharp-Crested Rectangular Weir** 2 End Contraction(s) 2.4' Crest Height

Primary OutFlow Max=6.11 cfs @ 12.72 hrs HW=67.09' (Free Discharge)
- **1=Culvert** (Barrel Controls 3.05 cfs @ 5.60 fps)
  - **2=Orifice/Grate** (Passes < 18.75 cfs potential flow)
  - **3=Orifice/Grate** (Passes < 0.49 cfs potential flow)
- **5=Culvert** (Barrel Controls 3.05 cfs @ 5.60 fps)
  - **6=Orifice/Grate** (Passes < 18.75 cfs potential flow)
  - **7=Orifice/Grate** (Passes < 0.38 cfs potential flow)

Secondary OutFlow Max=2.77 cfs @ 12.72 hrs HW=67.09' (Free Discharge)
- **4=Sharp-Crested Rectangular Weir** (Weir Controls 1.38 cfs @ 1.45 fps)
- **8=Sharp-Crested Rectangular Weir** (Weir Controls 1.38 cfs @ 1.45 fps)

Summary for Link DP-1: Wetland A

Inflow Area = 9.796 ac, 0.00% Impervious, Inflow Depth > 4.85" for 100-Years event
Inflow = 19.37 cfs @ 12.60 hrs, Volume= 3.959 af
Primary = 19.37 cfs @ 12.60 hrs, Volume= 3.959 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Summary for Link DP-2: Wetland B/C

Inflow Area = 18.978 ac, 0.00% Impervious, Inflow Depth = 4.88" for 100-Years event
Inflow = 53.57 cfs @ 12.30 hrs, Volume= 7.710 af
Primary = 53.57 cfs @ 12.30 hrs, Volume= 7.710 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Summary for Link DP-3: Wetland D

Inflow Area = 7.751 ac, 0.00% Impervious, Inflow Depth = 2.80" for 100-Years event
Inflow = 8.91 cfs @ 12.72 hrs, Volume= 1.807 af
Primary = 8.91 cfs @ 12.72 hrs, Volume= 1.807 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

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Appendix C: Standard 3 Computations and Supporting Documentation

- Preliminary Test Pit Data
- Soil Evaluation in accordance with Volume 3, Chapter 1 of the Handbook

Preliminary Test Pit Data

Memorandum

To: FILE

Date: July 21, 2021

Project #: 15225.02

From: Kenneth S. Staffier, PE
Soil Evaluator #2322

Re: Preliminary Test Pits
Proposed Solar Array
0 Locust Street
Freetown, Massachusetts

Preliminary Test Pits

On April 8, 2021 VHB completed 6 hand-dug test pits at 0 Locust Street in Freetown, MA to determine the depth to estimated seasonal and general soil characteristics within the location of proposed stormwater management practices (SMPs). The test pits were excavated to a depth ranging from 24" – 36" deep. The soil profile was generally consistent with an A horizon (forest mat) ranging from 2" – 8" thick; a B horizon (Loam to Sandy-Loam) ranging from 8" – 17" thick; and a C horizon (Sandy Loam) ranging from 4" – 22" thick. Groundwater was encountered fairly shallow at depths ranging from 18" – 24" below ground surface in Test Pit 1-1, 1-2 and 2-1. Redoximorphic features were identified in Test Pit 2-1, 3-1 and 4-1 at 24", 36" and 30" respectively. No groundwater or redoximorphic features were identified in Test Pit 5-1.

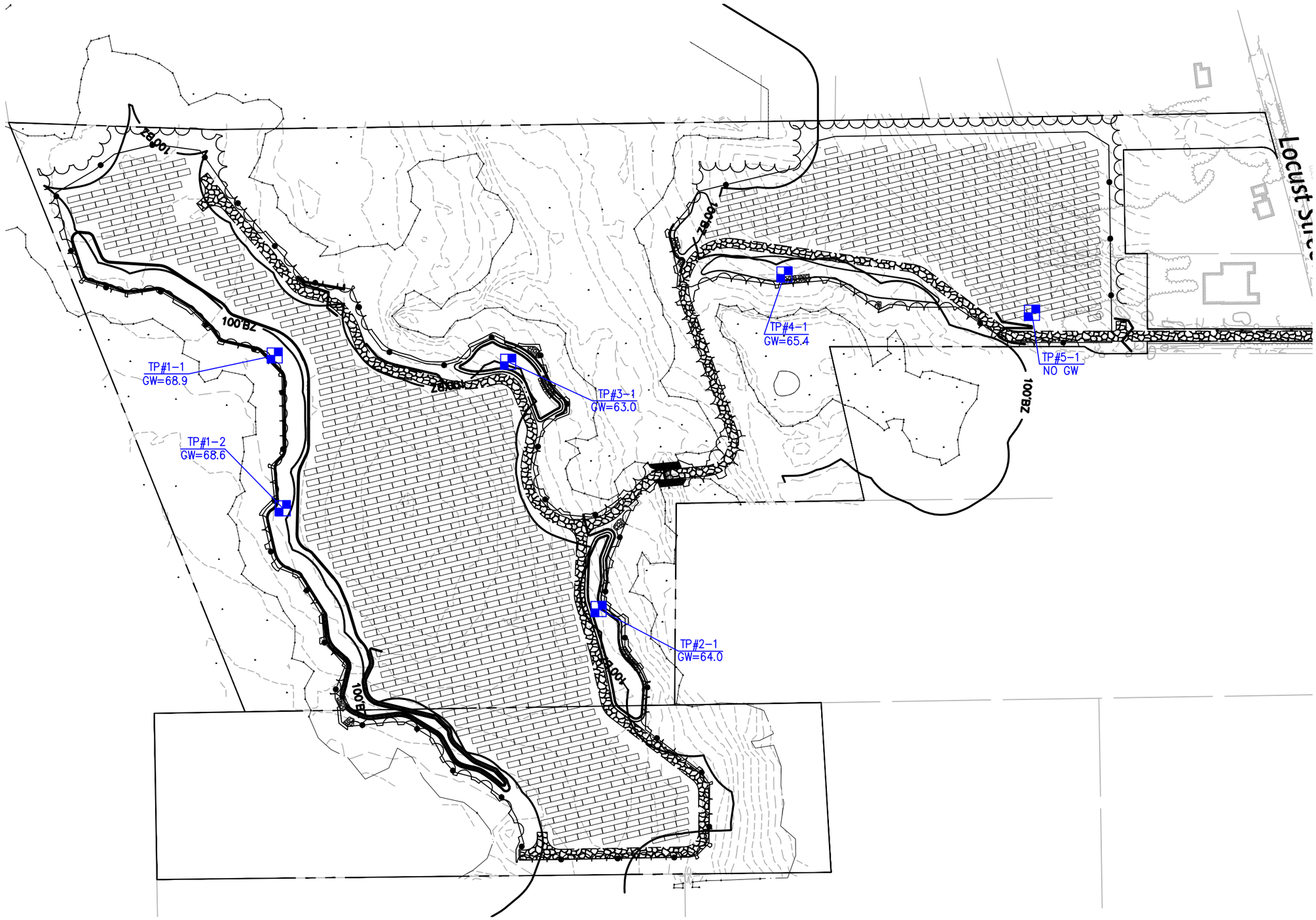
The test pit logs are outlined in Table 1 below:

Table 1 Test Pit Data

Test Pit	A Horizon	B Horizon	C Horizon	Depth to Estimated Seasonal High Groundwater
1-1	0"-6" Forest Mat	6"-15" Loam	15" -34" Fine Sandy Loam Water @ 18"	18"
1-2	0"-8" Forest Mat	8"-17" Sandy Loam	17"-24" Sandy Loam	20"
2-1	0"-8" Forest Mat	8"-24" Sandy Loam	24"-28" Sandy Loam	24"
3-1	0"-6" Forest Mat	6"-14" Sandy Loam	14"-36" Sandy Loam	36" (limited redox features)
4-1	0"-5" Forest Mat	5"-18" Sandy Loam	18"-34" Sandy Loam	30" (>5% redox features)
5-1	0"-2" Forest Mat	2"-19" Sandy Loam	19"-36" Sandy Loam	N/A

1 All measurements from ground surface

\\Vhb\gbl\proj\Wat-EV\15225.02 Longroad-TO2-Freetown\cad\ld\Eng\15225.02-Test Pit Figure.dwg



0 100 200 Feet

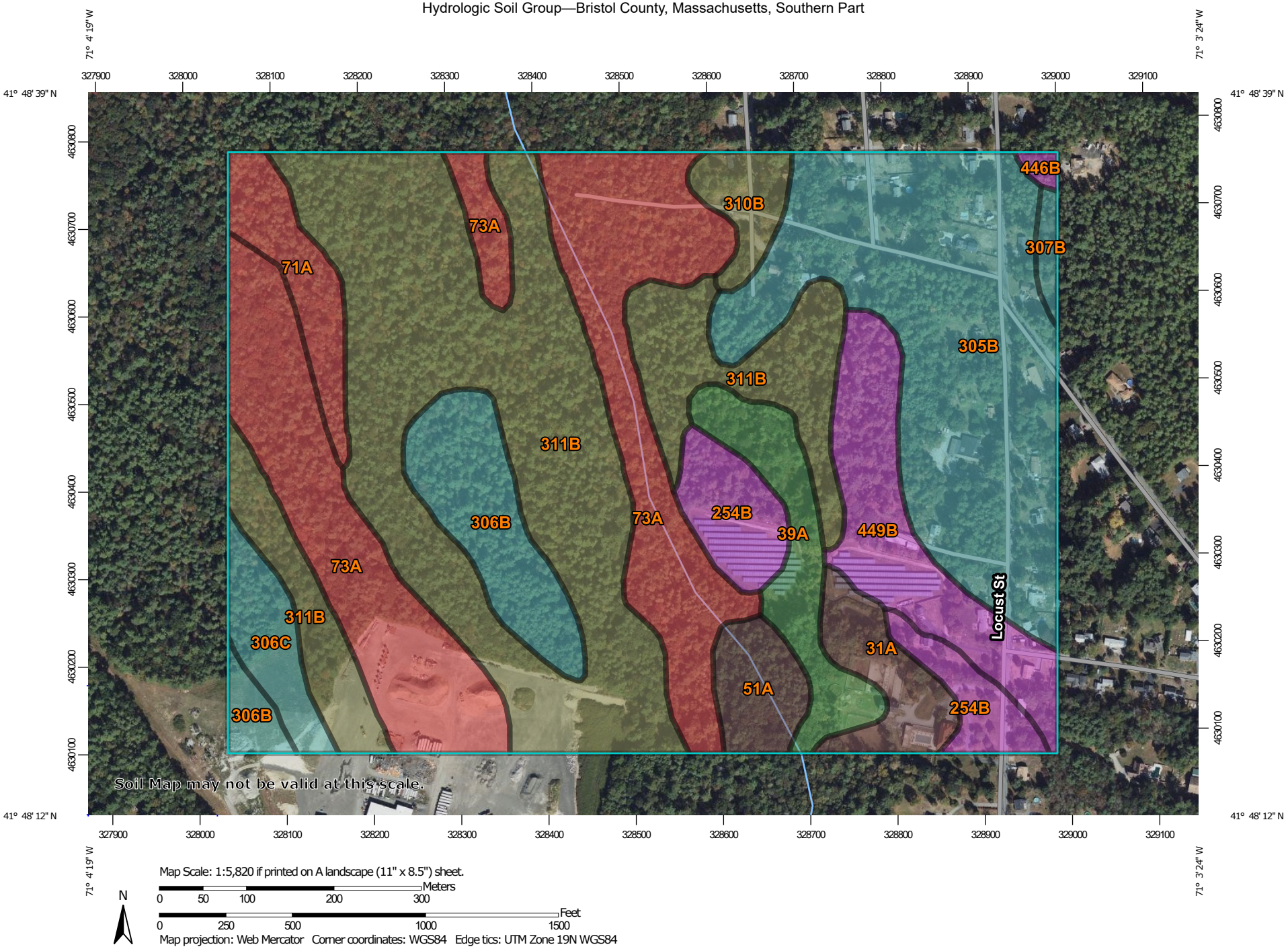
Test Pits

Locust Street
Freetown, Massachusetts

Figure 5

07/23/2021

Soil Evaluation


71° 4' 19" W
71° 3' 24" W
41° 48' 39" N
41° 48' 12" N
327900
328000
328100
328200
328300
328400
328500
328600
328700
328800
328900
329000
329100
4630800
4630700
4630600
4630500
4630400
4630300
4630200
4630100
446B
310B
73A
307B
71A
305B
311B
311B
306B
73A
254B
39A
449B
73A
311B
306C
31A
51A
306B
254B
Locust St
Soil Map may not be valid at this scale.
Map Scale: 1:5,820 if printed on A landscape (11" x 8.5") sheet.
N
Meters
0 50 100 200 300
Feet
0 250 500 1000 1500
Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 19N WGS84

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Rating Polygons

A
A/D
B
B/D
C
C/D
D
Not rated or not available

Soil Rating Lines

A
A/D
B
B/D
C
C/D
D
Not rated or not available

Soil Rating Points

A
A/D
B
B/D
C
C/D
D
Not rated or not available

Water Features

Streams and Canals

Transportation

Rails
Interstate Highways
US Routes
Major Roads
Local Roads

Background

Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:20,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Bristol County, Massachusetts, Southern Part
Survey Area Data: Version 14, Jun 9, 2020

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Sep 25, 2020—Oct 4, 2020

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
31A	Walpole sandy loam, 0 to 3 percent slopes	B/D	4.4	2.7%
39A	Scarboro mucky fine sandy loam, 0 to 3 percent slopes	A/D	6.4	4.0%
51A	Swansea muck, 0 to 1 percent slopes	B/D	3.5	2.1%
71A	Ridgebury fine sandy loam, 0 to 3 percent slopes, extremely stony	D	4.6	2.8%
73A	Whitman fine sandy loam, 0 to 3 percent slopes, extremely stony	D	32.1	19.8%
254B	Merrimac fine sandy loam, 3 to 8 percent slopes	A	6.6	4.1%
305B	Paxton fine sandy loam, 3 to 8 percent slopes	C	28.9	17.9%
306B	Paxton fine sandy loam, 0 to 8 percent slopes, very stony	C	8.8	5.4%
306C	Paxton fine sandy loam, 8 to 15 percent slopes, very stony	C	3.7	2.3%
307B	Paxton fine sandy loam, 0 to 8 percent slopes, extremely stony	C	0.8	0.5%
310B	Woodbridge fine sandy loam, 3 to 8 percent slopes	C/D	2.8	1.7%
311B	Woodbridge fine sandy loam, 0 to 8 percent slopes, very stony	C/D	49.4	30.5%
446B	Gloucester-Hinckley complex, 3 to 8 percent slopes, very stony	A	0.4	0.2%
449B	Gloucester-Hinckley complex, 3 to 8 percent slopes	A	9.8	6.1%
Totals for Area of Interest			**162.0**	**100.0%**

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

Appendix D: Standard 8 Supporting Information

› List of Recommended Construction Period BMPs

List of Recommended Construction Period BMPs

Erosion and Sedimentation Control Measures

The following erosion and sedimentation controls are for use during the earthwork and construction phases of the project. The following controls are provided as recommendations for the site contractor and do not constitute or replace the final Stormwater Pollution Prevention Plan that must be fully implemented by the Contractor and owner in Compliance with EPA NPDES regulations.

Silt Socks

Silt socks will be placed to trap sediment transported by runoff before it reaches the drainage system or leaves the construction site. Silt socks will be set at least four inches into the existing ground to minimize undercutting by runoff.

Silt Fencing

In areas where high runoff velocities or high sediment loads are expected, straw wattles will be backed up with silt fencing. This semi-permeable barrier made of a synthetic porous fabric will provide additional protection. The silt fences and straw wattles will be replaced as determined by periodic field inspections.

Gravel and Construction Entrance/Exit

A temporary crushed-stone construction entrance/exit will be constructed. A cross slope will be placed in the entrance to direct runoff to a protected catch basin inlet or settling area. If deemed necessary after construction begins, a wash pad may be included to wash off vehicle wheels before leaving the project site.

Diversion Channels

Diversion channels will be used to collect runoff from construction areas and discharge to either sedimentation basins or protected catch basin inlets.

Temporary Sediment Basins

Temporary sediment basins will be designed either as excavations or bermed stormwater detention structures (depending on grading) that will retain runoff for a sufficient period of time to allow suspended soil particles to settle out prior to discharge. These temporary basins will be located based on construction needs as determined by the contractor and outlet devices will be designed to control velocity

and sediment. Points of discharge from sediment basins will be stabilized to minimize erosion.

Vegetative Slope Stabilization

Stabilization of open soil surfaces will be implemented within 14 days after grading or construction activities have temporarily or permanently ceased, unless there is sufficient snow cover to prohibit implementation. Vegetative slope stabilization will be used to minimize erosion on slopes of 3:1 or flatter. Annual grasses, such as annual rye, will be used to ensure rapid germination and production of root mass. Permanent stabilization will be completed with the planting of perennial grasses or legumes. Establishment of temporary and permanent vegetative cover may be established by hydro-seeding or sodding. A suitable topsoil, good seedbed preparation, and adequate lime, fertilizer and water will be provided for effective establishment of these vegetative stabilization methods. Mulch will also be used after permanent seeding to protect soil from the impact of falling rain and to increase the capacity of the soil to absorb water.

Maintenance

- The contractor or subcontractor will be responsible for implementing each control shown on the Sedimentation and Erosion Control Plan. In accordance with EPA regulations, the contractor must sign a copy of a certification to verify that a plan has been prepared and that permit regulations are understood.

- The on-site contractor will inspect all sediment and erosion control structures periodically and after each rainfall event. Records of the inspections will be prepared and maintained on-site by the contractor.

- Silt shall be removed from behind barriers if greater than 6-inches deep or as needed.

- Damaged or deteriorated items will be repaired immediately after identification.

- The underside of straw bales should be kept in close contact with the earth and reset as necessary.

- Sediment that is collected in structures shall be disposed of properly and covered if stored on-site.

- Sediment control structures shall remain in place until all disturbed earth has been securely stabilized. After removal of structures, disturbed areas shall be regraded and stabilized as necessary.

The sedimentation and erosion control plan is included in project plan set; a reduced version and Erosion Control Maintenance checklist is included here for quick reference.

Spill Response Procedure

Initial Notification

In the event of a spill the facility and/or construction manager or supervisor will be notified immediately.

Facility Manager Name:	
Facility Manager Phone No.:	
Construction Manager Name:	
Construction Manager Phone No.:	

Assessment – Initial Containment

The supervisor or manager will assess the incident and initiate containment control measures with the appropriate spill containment equipment included in the spill kit kept on-site. The supervisor will first contact the Fire Department and then notify the Police Department, Board of Health and Conservation Commission. The fire department is ultimately responsible for matters of public health and safety and should be notified immediately.

Fire Department Telephone No.:	911
Police Department Telephone No.:	911
Board of Health Telephone No.:	(508) 644-2201 x 3
Conservation Commission Telephone:	(508) 644-2201

Further Notification

Based on the assessment from the Fire Chief, additional notification to a cleanup contractor may be made. The Massachusetts Department of Environmental Protection (DEP) and the EPA may be notified depending upon the nature and severity of the spill. The Fire Chief will be responsible for determining the level of cleanup and notification required. The attached list of emergency phone numbers shall be posted in the main construction/facility office and readily accessible to all employees.

HAZARDOUS WASTE / OIL SPILL REPORT

Date _____ Time _____ AM / PM

Exact location (Transformer #) _____

Type of equipment _____ Make _____ Size _____

S / N _____ Weather Conditions _____

On or near Water ☐ Yes If Yes, name of body of Water _____

☐ No

Type of chemical/oil spilled _____

Amount of chemical/oil spilled _____

Cause of Spill _____

Measures taken to contain or clean up spill _____

Amount of chemical/oil recovered _____ Method _____

Material collected as a result of cleanup:

_____ Drums containing _____

_____ Drums containing _____

_____ Drums containing _____

Location and method of debris disposal

_____

Name and address of any person, firm, or corporation suffering damages:

_____

Procedures, method, and precautions instituted to prevent a similar occurrence from recurring:

_____

Spill reported to General Office by _____ Time _____ AM / PM

Spill reported to DEP / National Response Center by _____

DEP Date _____ Time _____ AM / PM Inspector _____

NRC Date _____ Time _____ AM / PM Inspector _____

Additional comments: _____

EMERGENCY RESPONSE EQUIPMENT INVENTORY

The following equipment and materials shall be maintained at all times and stored in a secure area for long-term emergency response need.

--	SORBENT PADS	2 BALES
--	SORBENT BOOM	100 FEET
--	SAND BAGS (empty)	50
--	SEWER PIPE PLUGS	
--	12 INCH DIAM.	1
--	SPEEDI-DRI ABSORBENT	5 40# BAGS
--	SQUARE END SHOVELS	1
--	PICK	1
--	PRY BAR	1
--	DRAIN COVERS	2

EMERGENCY NOTIFICATION PHONE NUMBERS

1. SUPERVISOR/MANAGER

Name: _____ Beeper: _____

Phone: _____ Home Phone: _____

ALTERENATE

Name: _____ Beeper: _____

Phone: _____ Home Phone: _____

2. FIRE DEPARTMENT

Emergency: **911**

Business: (781) 270-1925

POLICE DEPARTMENT

Emergency: **911**

Business: _____

3. CLEANUP CONTRACTOR:

Address: _____

Phone: _____

4. MASSACHUSETTS DEPARTMENT OF ENVIRONMENTAL PROTECTION

Emergency: _____

Northeast Region – Woburn Office: _____

5. NATIONAL RESPONSE CENTER

Phone: (800) 424-8802

ALTERNATE: U.S. ENVIRONMENTAL PROTECTION AGENCY

Emergency: (617) 223-7265

Business: (617) 860-4300

6. CONSERVATION COMMISSION

Contact: (508) 644-2201

BOARD OF HEALTH

Contact: (508) 644-2201 x 3

7. FACILITY MANAGER

Name: _____

Phone: _____

Appendix E: Standard 9 Supporting Information

› Operations & Maintenance Plan

Operations & Maintenance Plan

Proposed Large-Scale Ground-Mounted Solar Photovoltaic Installation

0 Locust Street & 0 George D. Williams Lot
Freetown, MA

PREPARED FOR

Freetown East PV I, LLC
330 Congress Street
6th Floor
Boston, MA 02210
617.377.4301

PREPARED BY

101 Walnut Street
PO Box 9151
Watertown, MA 02471
617.924.1770

August 2021

Table of Contents

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Project Informtion

Site

Proposed Large-Scale Ground-Mounted Solar Photovoltaic Installation
0 Locust Street & 0 George D. Williams Lot
Freetown, MA

Developer

Freetown East PV I, LLC
330 Congress Street
6th Floor
Boston, MA 02210
617.377.4301

Site Supervisor - TBD

Site Manager Name
Site Manager Address
Site Manager City, State Zip
Site Manager Phone Number

Site Contact - TBD

Name: _____

Telephone: _____

Cell phone: _____

Email: _____

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Section A: Source Control

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A Source Control

A comprehensive source control program will be implemented at the Project Site, which includes the following components:

- Outlet control structure cleaning
- Clearing litter from the access drives, and perimeter landscape areas
- Spill Prevention training

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Section B: Spill Prevention

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B Spill Prevention

Spill prevention equipment and training will be provided by Freetown East PV I, LLC.

B.1 Initial Notification

In the event of a spill the facility and/or construction manager or supervisor will be notified immediately.

Facility Manager (name): _____

Facility Manager (phone): _____

Construction Manager (name) : _____

Construction Manager (phone): _____

The supervisor will first contact the Fire Department and then notify the Police Department, the Public Health Commission and the Conservation Commission. The Fire Department is ultimately responsible for matters of public health and safety and should be notified immediately.

B.2 Further Notification

Based on the assessment from the Fire Chief, additional notification to a cleanup contractor may be made. The Massachusetts Department of Environmental Protection (DEP) and the EPA may be notified depending upon the nature and severity of the spill. The Fire Chief will be responsible for determining the level of cleanup and notification required. The attached list of emergency phone numbers shall be posted in the main construction/facility office and readily accessible to all employees. A hazardous waste spill report shall be completed as necessary using the attached form.

Emergency Notification Phone Numbers

1. FACILITY MANAGER

Name: _____ Phone: _____

Beeper/Cell: _____

Home Phone: _____

Alternate Contact: _____ Phone: _____

Beeper/Cell: _____

Home Phone: _____

2. FIRE & POLICE DEPARTMENT Emergency: 911

3. CLEANUP CONTRACTOR

Address: _____ Phone: _____

4. MASSACHUSETTS DEPARTMENT OF ENVIRONMENTAL PROTECTION (DEP) Emergency: (888) 304-1133

5. NATIONAL RESPONSE CENTER Phone: (800) 424-8802

Alternate: U.S. Environmental Protection Agency Business: (888) 372-7341

6. FREETOWN BOARD OF HEALTH Phone: (508) 644-2201 x 3

FREETOWN CONSERVATION COMMISSION: Phone: (508) 644-2201

Hazardous Waste & Oil Spill Report

Date: _____ **Time:** _____ **AM / PM**

Exact location (Transformer #): _____

Type of equipment: _____ **Make:** _____ **Size:** _____

S / N: _____ **Weather Conditions:** _____

On or near water? ☐ Yes ☐ No **If yes, name of body of water:** _____

Type of chemical / oil spilled: _____

Amount of chemical / oil spilled: _____

Cause of spill: _____

Measures taken to contain or clean up spill: _____

Amount of chemical / oil recovered: _____ **Method:** _____

Material collected as a result of cleanup:

_____ drums containing _____

_____ drums containing _____

_____ drums containing _____

Location and method of debris disposal: _____

Name and address of any person, firm, or corporation suffering charges: _____

Procedures, method, and precautions instituted to prevent a similar occurrence from recurring: _____

Spill reported by General Office by: _____ **Time:** _____ **AM / PM**

Spill reported to DEP / National Response Center by: _____

DEP Date: _____ **Time:** _____ **AM / PM** **Inspector:** _____

NRC Date: _____ **Time:** _____ **AM / PM** **Inspector:** _____

Additional comments: _____

B.3 Assessment – Initial Containment

The supervisor or manager will assess the incident and initiate containment control measures with the appropriate spill containment equipment included in the spill kit kept on-site. A list of recommended spill equipment to be kept on site is included on the following page.

Fire / Police Department: 911

Freetown Board of Health (508) 644-2201 x 3

Freetown Conservation Commission: (508) 644-2201

Emergency Response Equipment

The following equipment and materials shall be maintained at all times and stored in a secure area for long-term emergency response need.

Supplies	Quantity	Recommended Suppliers
› Sorbent Pillows/"Pigs"	2	http://www.newpig.com Item # KIT276 — mobile container with two pigs
› Sorbent Boom/Sock	25 feet	http://www.forestry-suppliers.com
› Sorbent Pads	50	
› Lite-Dri® Absorbent	5 pounds	
› Shovel	1	Item # 33934 — Shovel (or equivalent)
› Pry Bar	1	Item # 43210 — Manhole cover pick (or equivalent)
› Goggles	1 pair	Item # 23334 — Goggles (or equivalent)
› Gloves – Heavy	1 pair	Item # 90926 — Gloves (or equivalent)

Section C: Snow Management

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C Snow Management

- Snow storage areas will be managed to prevent blockage of stormwater management features. Snow combined with sand and debris may block a storm drainage system, diminishing the infiltration capacity of the system and causing localized flooding.
- Sand and debris deposited on vegetated or paved areas shall be cleared from the site and properly disposed of at the end of the snow season, no later than May 15.
- Snow shall not be dumped into any waterbody, pond, or wetland resource area.

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Section D: Maintenance of Stormwater Management Systems

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D Maintenance of Stormwater Management Systems

D.1 Structural Stormwater Management Devices

D.1.1 Basin Outlet Control Structures

The proper removal of sediments and associated pollutants and trash occurs only when catch basin inlets and sumps are cleaned out regularly. The more frequent the cleaning, the less likely sediments will be re-suspended and subsequently discharged. In addition, frequent cleaning also results in more volume available for future deposition and enhances the overall performance. As noted in the pavement Operation and Maintenance (O&M) section, more frequent sweeping of paved surfaces will result in less accumulation in catch basins, less cleaning of subsurface structures, and less disposal costs.

There are five (5) outlet control structures on-site. These outlet control structures are constructed with sumps (minimum 4 feet) and hooded outlets to trap debris, sediments, and floating contaminants. Disposal of all sediments must be in accordance with applicable local, state, and federal guidelines. A map of the outlet control structure locations is included in Section E.5 Maintenance Checklists and Device Location Maps.

Inspections and Cleaning

- All outlet control structures shall be inspected at least four times per year and cleaned a minimum of at least once per year.
- Sediment (if more than six inches deep) and/or floatable pollutants shall be pumped from the basin and disposed of at an approved offsite facility in accordance with all applicable regulations.
- Any structural damage or other indication of malfunction will be reported to the site manager and repaired as necessary
- During colder periods, the grates must be kept free of snow and ice.
- During warmer periods, the grates must be kept free of leaves, litter, sand, and debris.

D.1.2 Stormwater Outfalls

The stormwater drainage system at Proposed Solar Array has five (5) outfall locations where treated stormwater is discharged to surface wetlands.

- Inspect outfall locations monthly for the first three months after construction to ensure proper functioning and correct any areas that have settled or experienced washouts.
- Inspect outfalls annually after initial three month period.
- Annual inspections should be supplemented after large storms, when washouts may occur.
- Maintain vegetation around outfalls to prevent blockages at the outfall.
- Maintain rip rap pad below each outfall and replace any washouts.
- Remove and dispose of any trash or debris at the outfall.

D.2 Vegetated Stormwater Management Devices

D.2.1 Surface Detention Basins

There are five (5) surface detention ponds at the Project Site. The detention ponds are completely vegetated basins that are designed to detain, clean and infiltrate roadway runoff. The maintenance of the detention basins may affect the functioning of stormwater management practices. This includes the condition of the side slope vegetation and the sediment deposits in the bottom of the ponds.

Initial Post-construction Inspection

- Infiltration basins should be inspected after every major storm for the first few months to ensure proper stabilization and function.

Long-term Maintenance

- The grass on the sideslopes and in the buffer areas should be mowed, and grass clippings, organic matter, and accumulated trash and debris removed, at least twice during the growing season.
- Eroded or barren spots should be reseeded immediately after inspection to prevent additional erosion and accumulation of sediment.
- Deep tilling can be used to break up a clogged surface area.
- Sediment should be removed from the basin as necessary. Removal procedures should not take place until the floor of the basin is thoroughly dry.

Inspections and Cleaning

- Infiltration basins should be inspected at least twice a year to ensure proper stabilization and function.

- Light equipment, which will not compact the underlying soil, should be used to remove the top layer.

D.2.2 Vegetated Areas Maintenance

Although not a structural component of the drainage system, the maintenance of vegetated areas may affect the functioning of the stormwater management system. This includes the health/density of vegetative cover and activities such as the application and disposal of lawn and garden care products, disposal of leaves and yard trimmings and proper aeration of soils.

- Inspect planted areas on a semi-annual basis and remove any litter.
- Maintain planted areas adjacent to pavement to prevent soil washout.
- Immediately clean any soil deposited on pavement.
- Re-seed bare areas; install appropriate erosion control measures when native soil is exposed or erosion channels are forming.
- Plant alternative mixture of grass species in the event of unsuccessful establishment.
- The grass vegetation should be cut to a height between three and four inches.
- Pesticide/Herbicide Usage – No pesticides are to be used unless a single spot treatment is required for a specific control application.
- Fertilizer usage should be avoided. If deemed necessary, slow release fertilizer should be used. Fertilizer may be used to begin the establishment of vegetation in bare or damaged areas, but should not be applied on a regular basis unless necessary.
- Annual application of compost amendments and aeration are recommended.

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Section E: Operations and Maintenance Plan Summary

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E Operations and Maintenance Plan Summary

This Operation and Maintenance Plan has been prepared in accordance with the Stormwater Management Policy developed by the DEP. It specifies operational practices and drainage system maintenance requirements for the Solar Array at 0 Locust Street in Freetown, Massachusetts. Requirements should be adjusted by the site manager as necessary to ensure successful functioning of system components.

E.1 Routine Maintenance Checklists

Routine required maintenance is described in Sections A – D. The following checklists are to be used by the property manager to implement and document the required maintenance and inspection tasks.

E.2 Reporting and Documentation

The site supervisor shall be responsible for ensuring that the scheduled tasks as described in this plan are appropriately completed and recorded in the Maintenance Log. Accurate records of all inspections, routine maintenance and repairs shall be documented and these records shall be available for inspection by members of the Freetown Conservation Commission, or their designated agent, upon request.

The Maintenance Log shall:

- Document the completion of required maintenance tasks.
- Identify the person responsible for the completion of tasks.
- Identify any outstanding problems, malfunctions or inconsistencies identified during the course of routine maintenance.
- Document specific repairs or replacements.

E.3 Construction Practices Maintenance/ Evaluation Checklist

Proposed Solar Array – Freetown, Massachusetts

Best Management Practice	Inspection Frequency	Date Inspected	Inspector Initials	Minimum Maintenance and Key Items to Check	Cleaning or Repair Needed ☐Yes/No (List Items)	Date of Cleaning or Repair	Performed by:
Silt Socks	Weekly and after ≥0.25 inches of rainfall			Sediment build up, broken sections			
Gravel Construction Exit	Weekly and after any rainfall			Filled voids, runoff/sediments into street			
Diversion Channels	Weekly and after any rainfall			Maintained, moved as necessary to correct locations, Check for erosion or breakout			
Temporary Sedimentation Basins	Weekly and after any rainfall			Cracking, erosion, breakout, sediment buildup, contaminants			

Stormwater Control Manager: _____

E.4 Long-term Maintenance/Evaluation Checklist

Proposed Solar Array – Freetown, Massachusetts

Best Management Practice	Minimum Maintenance and Key Items to Check	Inspection Frequency	Date Inspected	Inspector Initials	Cleaning Frequency	Cleaning or Repair Needed ☐Yes/No	Date of Cleaning or Repair	Performed by:
Outfall Structures	Remove debris and excess vegetation, replace any dislodged riprap	1X per year			1X per year			
Detention Basins	Remove sediment 1X per year or if >6 inches	1X per year			1X per year			

Stormwater Control Manager: _____

E.5 Maintenance Checklists and Device Location Maps

These checklists are provided for the maintenance crew to photocopy and use when conducting inspections and cleaning activities to the stormwater management systems.

Outlet Control Structures – Inspect 4 times per year, clean when sediment depth >6 inches or at least once per year.

OCS	Inspected (Y/N)	Sediment Depth (inches)	Cleaning needed (Y/N)	Date Cleaned	Comments (Trash, Oil, Pet waste, Lawn Debris, Damage)
OCS 101				/ /	
OCS 201				/ /	
OCS 203				/ /	
OCS 205				/ /	
OCS 301				/ /	

Outfalls – Inspect 4 times per year, replace any dislodged rip-rap, remove excess vegetation, remove any debris.

Outfall	Inspected (Y/N)	Sediment Depth (inches)	Cleaning needed (Y/N)	Date Cleaned	Comments (Trash, Oil, Pet waste, Lawn Debris, Damage)
FES 102				/ /	
FES 202				/ /	
FES 203				/ /	
FES 205				/ /	
FES 301				/ /	

Detention Basins – Inspect once per year, remove sediment if more than 6 inches has accumulated in sediment forebay or sediment collection row.

Basin	Inspected (Y/N)	Sediment Depth (inches)	Cleaning needed (Y/N)	Date Cleaned	Comments (Trash, Oil, Pet waste, Lawn Debris, Damage)
DB 1A				/ /	
DB 2A				/ /	
DB 2B				/ /	
DB 2C				/ /	
DB 3A				/ /	